Business Manager
B. Brittain Wilson

Publisher
Edward Lyman Bill

INDIA RUBBER WORLD

Editor
S. C. Stillwagon

Assistant Editor
Edward V. Osberg

Volume 98 May 1, 1938 Number 2

Contents

Articles

Departments

Departments

Published monthly by Bill Brothers Publishing Corp., 420 Lexington Ave., New York, N. Y. Cable Address, ELBILL, New York. Subscription $3.00 per year postpaid in the United States and Mexico; $3.50 per year postpaid to Canada; $4.00 per year postpaid to all other countries.

A BILL BROTHERS PUBLICATION

INDIA RUBBER WORLD

Published at 420 Lexington Avenue, New York, N. Y.

Volume 98 New York, May 1, 1938 Number 2

The Vulcanization of Rubber[1]

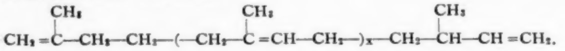
B. S. Garvey, Jr.[2]

THIS paper discusses, from a chemical and physical point of view, the salient points from the mass of research devoted to the vulcanization of rubber.

Unvulcanized rubber is amenable to factory processing because it is weak, plastic, tacky, and soluble. Vulcanized rubber has myriad uses because it is strong, elastic, nontacky, and insoluble. Vulcanization may be defined as the change from the first set of properties to the second. A study of the chemistry of vulcanization requires an examination of the constitution of crude rubber, its reactions, and their relation to these changes in its physical properties.

The Rubber Molecule

Rubber is classified as a linear high polymer with the conventional formula:



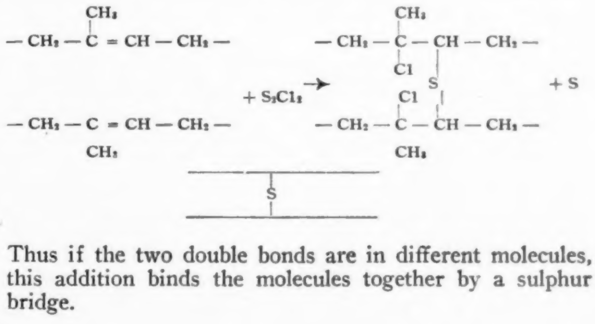
The value of x is unknown, but is estimated to be between 500 and 3,000 which gives a molecular weight between 34,000 and 204,000. That the main part of the molecule consists of isopentene groups is well established by the ozonization studies of Harries[3] and of Pummerer.[4] The only evidence as to the nature of the end groups is that of Midgley, Henne, Shepard, and Renoll,[5] who reported the presence of one atom of oxygen, apparently as a hydroxyl group, for each 1,000 C_5H_8 groups. Chemically such a molecule would be very difficult to distinguish from that shown in the above formula.

The idea that rubber is a linear hydrocarbon has been supported particularly by the work of Staudinger[6] and Carothers.[7] The exact molecular weight and its relation to the physical properties of the hydrocarbon are still a matter of controversy.

Chemical Reactions

The chemical reactions of rubber are essentially those of polyolefin of high molecular weight. However the following facts must be borne in mind. Reaction conditions are limited by the impermeability of rubber to many reagents and by the high viscosity of its solutions. Crude rubber and all compounded stocks contain non-rubber constituents which may act as catalysts or inhibitors for various reactions. Few organic reactions are free from side reactions, and, with several hundred double bonds, the main reaction and several side reactions may all occur in each molecule, making it impossible to separate the main product from the by-products. The products are generally colloidal and amorphous and therefore extremely difficult to isolate, purify, and identify.

When the reagents are monofunctional, as in the case of HBr and Br_2, addition reactions do not cause vulcanization. On the other hand the addition of the bifunctional reagent, sulphur monochloride, does cause vulcanization. Meyer and Mark[8] have presented excellent evidence that the addition of sulphur chloride to rubber is essentially the same as the mustard gas reaction and is as follows:



Thus if the two double bonds are in different molecules, this addition binds the molecules together by a sulphur bridge.

[1] Presented at the Ohio-Michigan regional meeting of the American Chemical Society, Columbus, O., Nov. 20-21, 1937.

[2] Chemical Research Laboratories, B. F. Goodrich Co., Akron, O.

[3] C. D. Harries, "Untersuchungen uber die Naturlichen und Kunstlichen Kautschuckarten," Springer, Berlin, 1919.

[4] R. Pummerer, G. Ebermayer, and K. Gerlach, *Ber.*, 64, 809 (1931); *Rubber Chem. Tech.*, 4, 386 (1931).

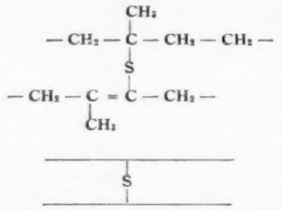
[5] T. Midgley, Jr., A. L. Henne, A. F. Shepard, and M. W. Renoll, *J. Am. Chem. Soc.*, 57, 2318 (1935).

[6] H. Staudinger, "Die Hochmolekularen Organischen Verbindungen," Springer, Berlin, 1932.

[7] W. L. Carothers, *Chem. Rev.*, 8, 353 (1931).

[8] K. H. Meyer and H. Mark, *Ber.*, 61, 1948 (1928).

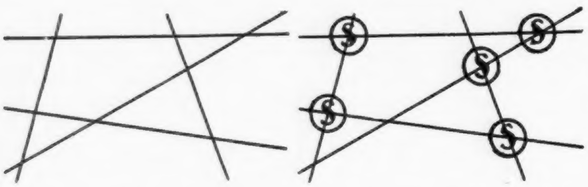
The addition of sulphur also causes vulcanization, sulphur adding to the hydrocarbon with a loss in unsaturation equivalent to one double bond for each sulphur atom. Meyer and Hohenemser[9] showed that vulcanized rubber will react with methyl iodide, apparently forming a sulphonium salt similar to that formed with dimethyl sulphide. They also found that when cyclohexene was heated with sulphur, two molecules were joined by a sulphur bridge. These results indicate that when sulphur adds to rubber, a sulphur bridge of the following type is formed:



Chemical Cross Bonding

The diagrams below illustrate differences in molecular structure between vulcanized and unvulcanized rubber which can be related to the differences in physical properties. The first set illustrates most simply the sulphur bridges. The second shows, in projection, a brush heap structure of the fiber molecules in random distribution.

Unvulcanized — Vulcanized



Weak, Plastic, Soluble — Strong, Elastic, Insoluble

In the case of vulcanized rubber, slippage between molecules is limited by the sulphur bridges which tend to prevent the separation of the molecules by extension or by solvents. Such a product would be neither plastic nor soluble. In unvulcanized rubber there are no sulphur bridges and the molecules can slip easily past each other.

In the left-hand diagrams none of the points on any one molecule have any fixed relation to points on another molecule. In the right-hand diagrams, however, each sulphur bridge, or cross bond, holds points on two molecules in a fixed relation to each other. The essential difference between the two arrangements is the presence of "fixed points within the circles. The establishment of sulphur bridges is the mechanism whereby certain points are fixed relative to each other. Forming primary valence bridges of this type may be called "chemical cross bonding."

Mechanical Cross Bonding

There is a wide range of physical properties and degree of vulcanization for compounds containing the same amount of combined sulphur. For example, a compound may be fairly well vulcanized with all of the sulphur combined after 15 minutes' heating.[10] When the same compound is heated six hours, it may revert so that the degree of vulcanization is much lower although the combined sulphur is the same. These facts suggest that a non-sulphur vulcanizing action, which does not materially affect the number of double bonds, must also occur.

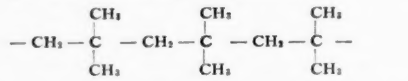
It has been suggested[11] that this reaction may be geometric rearrangement at some of the double bonds, thus converting the comparatively straight fiber molecules into kinky ones and establishing "mechanical cross bonds." This suggestion requires some explanation of the nature of mechanical cross bonds and their relation to the shape of the molecule.

As was pointed out by Williams,[12] a ball of well-milled rubber will bounce as well as one of vulcanized rubber. Under impact the temporary equivalent of fixed points is established in the masticated rubber because in many places the molecules become entangled and cannot slide past each other rapidly enough to yield under stress. This phenomenon may be called mechanical cross bonding due to the entanglement of fiber molecules.

Since the ball of masticated rubber can be reshaped by hand, it is apparent that the temporary mechanical cross bonds can be readily destroyed by this slow acting force. Since it will again bounce, a new set of cross bonds is established under the new impact. Thus the requirement for elasticity seems to be not that the individual cross bonds be permanent, but that at any given instant there be a sufficient number of cross bonds, or fixed points, to cause recovery.

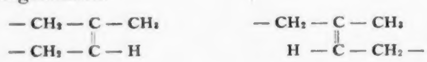
Polyisobutylene, one of the newer, synthetic, elastic materials, is elastic even at fairly high temperatures, thus resembling to some extent vulcanized rubber. However under a constant load for 24 hours it flows considerably, resembling masticated rubber in this respect as well as by its solubility in gasoline. The resemblance to unvulcanized rubber may be attributed to a lack of chemical cross bonds. The resemblance to vulcanized rubber may be attributed to mechanical cross bonds which are effective over wider ranges of temperature and rate of applied force than are those in masticated rubber.

Polyisobutylene is a high molecular polymer which appears to have the following structure:



The greater persistence of the mechanical cross bonds in this material appears to be due to a difference in shape of these fiber molecules from those in unvulcanized rubber.

Each double bond in rubber may have either a cis or a trans configuration.



cis — trans

Geometric rearrangement at some of the double bonds would change the shape of the molecules and might change comparatively straight fiber molecules into kinky ones. Such a change would result in the formation of many mechanical cross bonds of comparatively great persistence.

Figure 1[11] shows, by a space model, a section of the rubber molecule with all of the double bonds in the trans configuration; while Figure 2 illustrates how the molecule might become kinked if two double bonds became rearranged to the cis form.

[9] K. H. Meyer and W. Hohenemser, *Helv. Chim. Acta.* 18, 1061 (1935); *Rubber Chem. Tech.*, 9, 201 (1936).
[10] B. S. Garvey, Jr., and G. Thompson, *Ind. Eng. Chem.*, 25, 1292 (1933).
[11] B. S. Garvey, Jr., *Ind. Eng. Chem.*, 29, 208 (1937).
[12] I. Williams, *Ind. Eng. Chem.*, 21, 872 (1929).

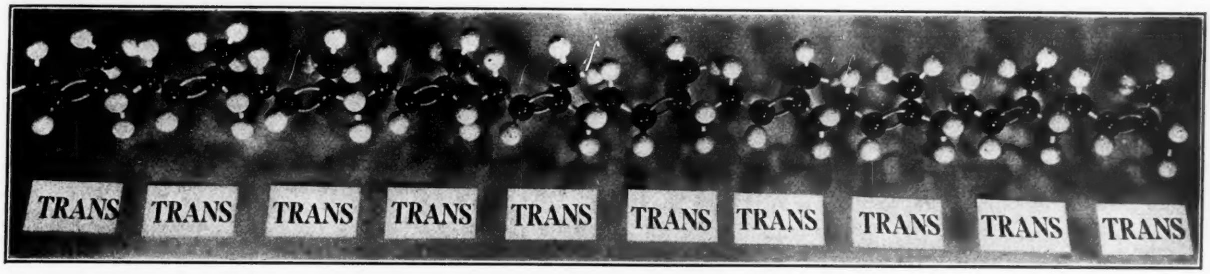


Fig. 1. Space Model—Double Bonds in Trans Configuration

By free rotation around single bonds the molecules could again become comparatively straight as shown in Figure 3. This straightening of the molecules may explain "reversion," or the decrease in the degree of vulcanization in long cures as compared with short cures.

Mechanical cross bonds establish fixed points by making snarls in the fiber molecules which are difficult to untangle. first, the sulphur bridges would make the untangling much more difficult. The mechanical bonds would be locked so that they could not be broken without breaking chemical bonds. At the same time the comparative flexibility of the mechanical bonds would be retained. Thus the physical properties of the cured products depend not only on the extent to which the two reactions progress, but also on their relative rates.

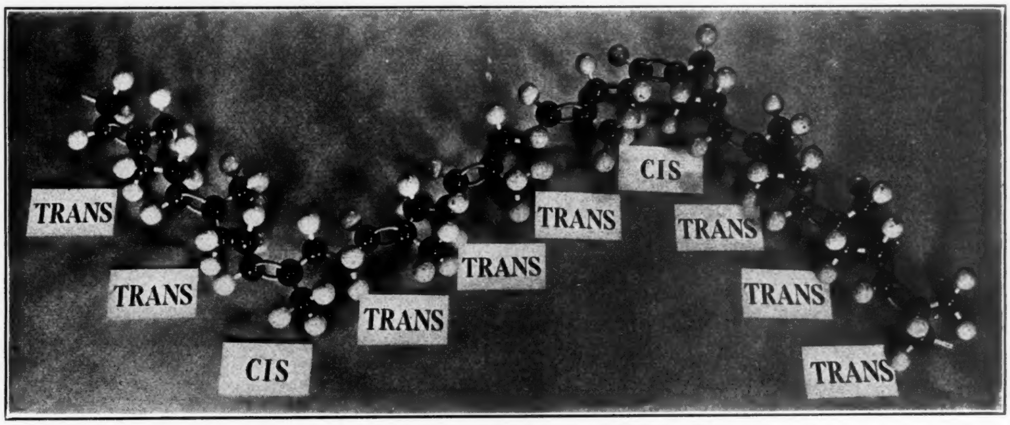


Fig. 2. Space Model—Two Double Bonds in Cis Form

Relation to the Vulcanizate

Chemical cross bonds and mechanical cross bonds appear to have different effects on the properties of the vulcanizate. For example, mechanical cross bonds would be less rigid than sulphur bridges and by slight yielding would permit distribution of applied force over a larger number of bonds and give a product of higher tensile strength and greater toughness.

These differences in properties also depend on which type of cross bond is established first. If the sulphur bridges are formed first, they will not have much effect on the difficulty of untangling the snarls which are mechanical cross bonds. However, if the entanglement took place

Chemistry of Vulcanization

Chemically vulcanization may be considered as the establishment, between fiber molecules, of cross bonds which persist over a wide variety of conditions. They may be chemical, or mechanical, or a combination of both. Chemical cross bonds are formed by the joining of adjacent molecules by primary valence bonds, either directly from carbon to carbon or through a third atom. Mechanical cross bonds would be established by changes in the shapes of the molecules leading to greater mechanical entangle-

(*Continued on page* 48)

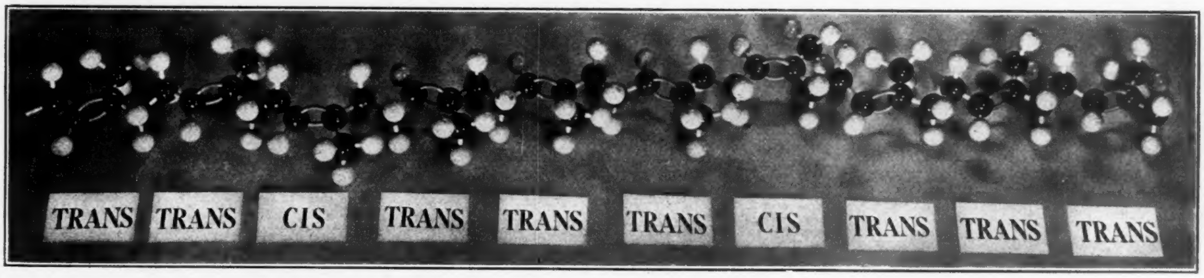
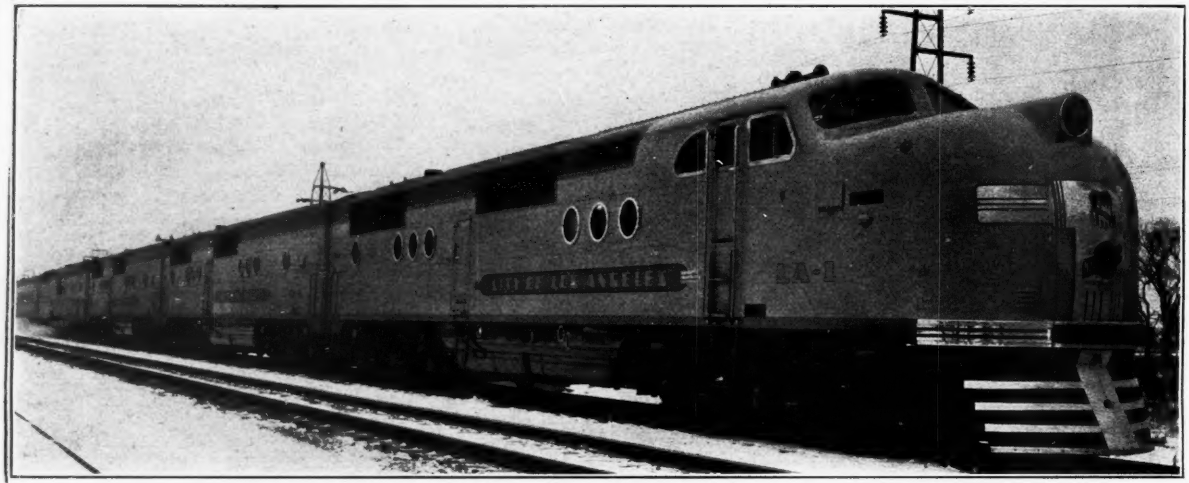


Fig. 3. Space Model—Same as Figure 2, but with Molecule Straightened by Free Rotation

Rubber in New Streamline Trains



THAT rubber is playing an increasingly important role in providing noiseless and vibrationless comfort in all types of commercial travel is a well-established fact. The latest developments in fast and comfortable train construction have been incorporated into the design of the two new streamliners, the "City of Los Angeles" and the "City of San Francisco." The former is owned jointly by the Union Pacific and the Chicago and North Western; while the latter is owned by three companies, the above-mentioned and the Southern Pacific. The construction of the two trains is similar, and both make use of a liberal quantity of rubber.

Trucks and Draft Gears

The pedestal liners of all of the train trucks except those used for power are made in laminated form, consisting of an inner plate of O.H. steel and an outer plate of manganese steel between which is vulcanized a $^5/_{16}$-inch layer of rubber. Each truck bolster is also provided with rubber blocks, and a pad of rubber and canvas composition, vulcanized to a steel plate, is applied on the top of each load-carrying coil spring.

Rubber draft gears which tend to lighten the load of pulling the cars and absorb shock in slowing, starting, or stopping are provided for all cars including the power units.

Outer Diaphragms

To provide continuity of the streamlining between cars, flexible rubber diaphragms are used. The cars, with the exception of those used for power, come in units of two cars each with a common truck located at their juncture beneath the vestibule. These articulated units are coupled together to form the complete train. Between articulated cars outer and inner diaphragms are provided; these diaphragms are of molded rubber, ¼-inch thick and with a heavy bead at each edge for attaching the diaphragms to the car ends. Between articulated dining cars, a second inner diaphragm is separated from the other inner diaphragm by a one-inch air space to provide an insulating effect at this location. As both dining cars have a common kitchen located in one car, it was found necessary to separate the passageway used by passengers and that used by servants. This separation is accomplished by another ¼-inch rubber diaphragm which extends across the articulation directly over the center plates. Here a heavy rubber foot plate with steel reenforcement is used to provide the required flexibility and sound deadening effect.

At the coupled ends of cars the outer diaphragm extends from the end of the car to a common face plate. In order to reduce noise and vibration at the diaphragm the center supporting stems are mounted in rubber composition lined pockets; while the alining and tension arms have rubber bushed pivots or joints, the rubber being vulcanized in place.

Other Applications

All window and door glass is set in molded rubber glazing channels, and where the dehydrated types of window units are used, these are also set in molded rubber. All weather stripping is of either soft or sponge rubber; both types are used in the train.

At the front of the forward power unit is a large rubber bumper which provides protection to the train when being hauled by a steam locomotive.

Cushioning for car seats, chairs, settees, etc., is of a sponge rubber material formed to suit the particular equipment. Rubber floor covering is used in the vestibules, toilet rooms, and passageways, and in cars where the floors are carpeted, ⅜-inch sponge rubber padding is used under the carpet.

Evaluation of Plastics[1]

T. Smith Taylor[2]

IN GENERAL a "plastic" is any substance which can be deformed under mechanical stress without losing its coherence. This broad definition would include a very large number of classes of materials, such as clays, plasters, all sorts of resins, putty, cement, and even metals. Naturally our discussion will not cover such a broad field, but will be restricted to some of those materials which are termed plastics in industry—such as shellac, rubber, synthetic resins, casein products, and cellulose derivatives. Certain materials may be considered as plastic under one given set of conditions of pressure and temperature; while under a different set of conditions with new characteristics they may be thought of as lacking this property.

THROUGH research during the past 20 years the number and the application of plastics have increased to the point where they constitute an integral part of our industries and are assuming great importance. This article discusses the properties and possibilities of application of some of the better known thermoplastic and thermosetting materials. Of particular interest is the author's contention that because of its diversification, rubber has really assumed the position of a separate class of material.

Natural plastics include the natural resins, gums, waxes, shellacs, and even rubber, and products made by using them. A synthetic plastic is one made by using a synthetic resin which is formed by synthesis using as reactants one or more non-resinous organic materials. They may have properties similar to those of natural resins, but not necessarily so.

In considering plastics from the standpoint of the effects of heat upon them, it is convenient to divide them into two groups. The one group embraces those known as thermoplastics, or heat-non-convertible materials. Such substances are adequately rigid at the temperatures and pressures to which they are normally subjected. They are deformable, however, under the application of heat and pressure.

The other group, according to the effects of heat, contains those materials known as "thermosetting" or "thermohardening," that is, heat convertible. These "thermosetting" substances originally possess the same properties as the thermoplastic materials. Under the influence of heat they undergo chemical changes which render them permanently infusible.

To illustrate the commercial possibilities and wide application of this class of materials, some of the better-known types of plastics are discussed below with particular reference to their properties and uses.

Rubber

It is quite proper that among the plastics some consideration should be given to rubber. In general the name "rubber" and its various forms do not carry with them the idea of being plastics as is the case for the materials made using either the ordinary natural resins or the synthetic resins. On the contrary, as a result of the numerous forms and products in which this rubber group has commercial application, it really has assumed the role of a separate class of material all its own.

As a plastic, rubber may be considered as being used very extensively at all degrees of plasticity from the very soft thermoplastic type to quite hard thermosetting or vulcanized types. That it is possible for the rubber technologist to start with the latex bearing cells of the rubber-bearing tree and alter them so as to produce such a variety of resultant products is really astounding. However the fact that he must start with the one type of cell does limit his possibilities. It is here where the field of synthetic rubber presents its possibilities. Thus by varying the raw materials and their method of synthesis, a variety of rubber-like substances may be produced, each designed to meet the requirements of a particular field.

Shellac

Shellac possesses unusual hardness, toughness, and durability to wear. Chemically, shellac resin consists of various hydroxy acids which may be partly combined with each other as lactones or anhydrides. Among the uses for shellac and its compounds may be mentioned: its use as a varnish or protective coating, as a binder for mica flakes, in molded materials, in grinding wheels, in the production of phonograph records, and as an electrical insulator.

Cold-Molded Plastics

So-called cold-molded plastics are made using mixtures of asbestos or other fillers with pitch, shellac, cements, and other binders. After being formed to the desired shape by pressure in a mold, they are subsequently baked or heat treated.

Cellulose Plastics

(a) Cellulose nitrate or pyroxylin is a true thermoplastic, and, by reason of its process of manufacture, innumerable colored and variegated effects are possible. It is readily fashioned by molding, bending, and machining and possesses highly decorative qualities.

(b) Cellulose acetate is primarily cellulose, usually in

[1] Abstracted from the Edgar Marburg Lecture, "Plastics—Some Applications and Methods of Testing," read on June 30, 1937, before the annual meeting of the American Society for Testing Materials, New York, N. Y.
[2] Manager, Engineering Laboratory, Diehl Mfg. Co., Elizabethport, N. J.

the form of cotton linters esterified with acetic acid and acetic anhydride. It differs greatly from cellulose nitrate in that the nitrate burns quickly and violently; while the acetate plastic materials are non-hazardous, burning more like wood, hard rubber, heavy cardboard, and similar materials. The acetate plastics are marketed in the form of sheets, rods, and tubes for fabricating and also in the form of blanks and powders for molding.

(c) Ethyl cellulose plastics are formulated using ethyl cellulose. Ethyl cellulose is prepared by the reaction of ethyl chloride on alkali cellulose and is supplied as a white granular powder. Plastics are readily formulated with ethyl cellulose since it is readily soluble in and miscible with many plasticizers and resins.

Phenol-Formaldehyde Plastics

The process of manufacturing a typical phenolic resinoid consists of placing weighed quantities of phenol and formaldehyde solutions in a closed jacketed kettle and then heating by means of sending steam into the jacket until the reaction proceeds actively. After the completion of the reaction in a few hours or less, it is found that the contents of the kettle have separated into two parts: an aqueous layer above and a layer of molten resinoid below. This resinoid is soluble in alcohol and, when so dissolved, constitutes the varnish with which paper and cloth are treated to form the paper and laminated products. The process of manufacture of the laminated sheets is to press the desired number of sheets, previously treated with the varnish and dried so as to get rid of the solvent, between heated platens in a hydraulic press for sufficient length of time to cause the reaction to be completed—thus thermosetting the resin.

Cast Phenolics

Cast resins differ from the molding and laminated types in that they are poured into molds in their liquid form and then cured in the mold at elevated temperatures. The cast resinoids may vary in properties from a thermoplastic nature to a completely thermosetting character depending upon materials of composition and heat treatment. In general, the molded piece is not the finished product, but requires subsequent machining and polishing.

Urea-Formaldehyde Plastics

The urea-formaldehyde compounds were not developed to supplant the phenolics, but rather to supplement them. Not only can beautiful colors and shades be produced in urea compounds, but "light fast" shades are likewise produced. The colors are also "non-bleeding" in alcohol, acetone, and other common solvents. They are odorless and tasteless as is evident from their use in tableware in which hot foods and liquids are used. They are infusible, but char at high temperatures. They offer high resistance to arcing over their surface and can be used in electrical equipment where spark-over may occur. They retain excellent insulating properties after immersion in water or contact with damp air. They possess a high degree of flexibility, are high in impact strength, and have excellent tensile strength.

Furfural-Phenol Resins

The furfural resin was developed to meet certain requirements of printing plates. One exceptional property of these resins is their long-drawn-out and flat plasticity curve at the preliminary heating temperatures with little, if any, polymerization and then a very rapid and almost vertical final polymerization at temperatures above 320° F. This property greatly increases the temperature range over which it can be used.

Vinyl Resin Plastics

The vinyl group of resins can be divided into several different series; each series has its own general characteristics and physical properties.

(a) One of these series is obtained by the polymerization of vinyl acetate. These resins have relatively low moisture absorption, low heat distortion point, burn slowly, are soluble in most solvents except water, gasoline, and higher alcohols, are colorless, odorless, tasteless, and non-toxic. These resins are widely used as adhesives and have been found extremely useful as an adhesive for cloth, paper, cardboard, porcelain, metal, mica, stone, leather, wood, glass, plastic sheets, and films.

(b) A second series of vinyl resins is obtained by the co-polymerization of vinyl acetate and vinyl chloride. These are also colorless, tasteless, odorless, and non-toxic. They possess extreme chemical inertness, being unaffected by alkalies, oxidizing agents, and most acids. These resins are not compatible with nitrocellulose or with most resins or drying oils and, hence, form the sole film-forming constituent when used in the formation of surface coatings.

(c) A third group of vinyl resins is an aldehyde reaction product. Probably its chief application is in connection with the manufacture of safety glass, where it produces a glass of exceptional qualities particularly as to breakage at low temperature. The glass is little affected by moisture even after long exposure, does not require sealing at edges after being cut, and is also easily cut.

Acrylic Resin

The acrylic resins are outstanding in their colorless transparency. They have excellent adhesion; are extremely elastic; and they are chemically resistant to many reagents. Their polymers are relatively unaffected by light, heat, and oxidizing agents, and they range from soft, sticky semi-liquids to hard, tough thermoplastics. Various degrees of hardness between these limits are possible by proper modifications during their manufacture without the use of plasticizers.

Cumarone Resin

The cumar resins, thermoplastic materials, may be obtained from crude coal-tar naphthas in the approximate boiling range of 150 to 200° C. They are available in a wide range of colors from faint yellow to darker colors and in softening points from 10 to 160° C. Being essentially a polymerized hydrocarbon, they may be considered as neutral and stable. The resin is insoluble in water, is not saponified or dissolved in alkalies, has good acid resistance, is soluble in such solvents as benzol and toluol, and has good weathering properties. The resin has properties which make it particularly well suited as a binder in floor tile. It is compatible with the constituents of chewing gum. It is an important constituent in rubber compounding since it blends well with rubber and facilitates the milling operations. Also its electrical properties make it well suited for electrical insulation service.

Polystyrene

Polystyrene, a true thermoplastic, is derived from sty-

(*Continued on page* 53)

Patent Legislation—Bill H. R. 10068

Second Proposed Bill for Compulsory License

BECAUSE of strenuous opposition at the hearings in March on the proposed McFarlane Bill, H. R. 9259, introduced January 31, 1938, Mr. McFarlane introduced in the House of Representatives on March 29, 1938, a second bill, H. R. 10068, which was referred to the Committee on Patents and ordered to be printed. Hearings on H. R. 9259 were recessed subject to the call of the chairman of the subcommittee in charge of the bill.

For the benefit of those interested, the newly proposed bill H. R. 10068 is published below in full.

A Bill to Provide for Compulsory Licensing of Patents

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 35 of the Revised Statutes is amended to read as follows:

SAME; OATH OF APPLICANT. The applicant shall make oath that he does verily believe himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement, or of the variety of plant, for which he solicits a patent; that he does not know and does not believe that the same was ever before known or used; and shall state of what country he is a citizen, and all owners of patents whose term has not expired and all applications pending and all applications hereafter filed shall file an itemized statement setting forth the time he has devoted to the development of the patent, and all expenses incurred, as well as the intrinsic value of his patent. Such oath may be made before any person within the United States authorized by law to administer oaths, or, when the applicant resides in a foreign country, before any Minister, Charge d'Affaires, or consul, holding commission under the Government of the United States, or before any notary public, judge, or magistrate having an official seal and authorized to administer oaths in the foreign country in which the applicant may be, whose authority shall be proved by certificate of a diplomatic or consular officer of the United States.

SEC. 2. That section 40 of the Revised Statutes is amended to read as follows:

Every patent shall contain a short title or description of the invention or discovery, correctly indicating its nature and design, and a grant to the patentee, his heirs or assigns, for the term of 17 years of the exclusive right to a royalty through the licensing of the invention or discovery or to vend the invention or discovery (including in the case of a plant patent, the exclusive right to asexually reproduce the plant) throughout the United States and Territories thereof, referring to the specification for the particulars thereof. A copy of the specification and drawings shall be annexed to the patent and be a part thereof. For the first five years of the patent grant the inventor shall have the exclusive right to make, use and vend, in addition to the rights enumerated above, the invention or discovery.

Application for a License.

SEC. 3. At any time after the expiration of five years from the date of issuance of a patent where satisfactory evidence is submitted showing that a patent is not being used or that the domestic supply is insufficient to satisfy the public demand or that unfair prices or trade practices prevail, any person may file with the Commissioner of Patents an application for a license under said patent, setting forth under oath his reasons why such license should be granted. The applicant shall file with the Commissioner of Patents—

1. Evidence that the applicant is an interested party, financially responsible, and able to manufacture such patent.

2. A statement that the public interest will be advanced by issuing to him a compulsory license for such patent.

3. An offer which shall include specific terms, conditions, and royalties under which the applicant proposes to use such a patent, if his application for such license is granted.

Notice

SEC. 4. (1) If the Commissioner of Patents determines that the applicant is an interested party, financially responsible, and able to manufacture such patent; and

(2) That the public interest will be served by the granting of a compulsory license, he shall publish a notice of the application and his decision in the Official Gazette of the United States Patent Office for at least four consecutive weekly issues. In such notice he shall specify that any person having any right, title, or interest in such patent may upon application be permitted to intervene to show cause why such license should not be issued to the applicant. A copy of such notice shall be served by registered mail upon the patentee and upon any attorney recorded in the Patent Office as having last represented such patentee in respect of obtaining the grant of such patent.

Hearing

SEC. 5. (a) The Commissioner of Patents shall, in the notice provided for in section 4, specify a time (not later than 30 days after the date of the last publication authorized in section 4) and place for a hearing in respect to such application.

(b) At such time the applicant, the patentee, and any other person claiming any right, title, or interest in or to such patent may appear and under oath file answer and be heard in respect to such application.

(c) If within 30 days after date of such last publication the patentee or any person claiming any right, title, or interest in such patent fails to appear to show cause why such license should not be granted, or if such patentee or attorney fails to answer the notice served upon

(*Continued on page 53*)

New "Thiokol" Plant

On THE first of May a new manufacturing plant for the production of "Thiokol" synthetic rubber was officially put in operation at Midland, Mich., on the Dow Chemical Co. premises. The erection of this modern and larger plant is symbolic of the progress synthetic rubber has made in this country during the past few years. Since the beginning of commercial production of "Thiokol" at Yardville, N. J., in 1931, marked advancement has been made in the processes of manufacture as well as in practical application of the product. The advantages of large-scale production are made possible in this new plant which is said to have a normal capacity of approximately 2,000,000 pounds per year.

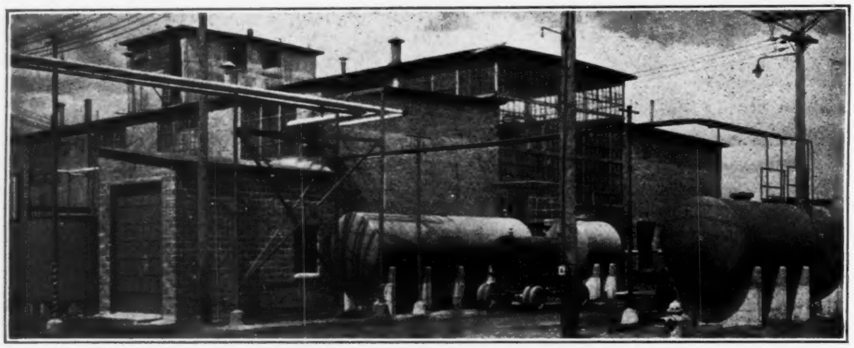


Fig. 1. External View of Dow "Thiokol" Plant

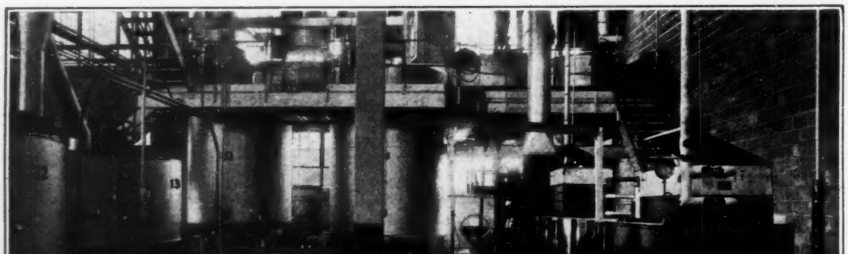


Fig. 2. Interior View of Plant

Heretofore the raw materials used in the manufacture of "Thiokol" have been produced by the Dow Chemical Co., Midland, Mich. Because of the need of expansion and the advantages to be gained from locating the manufacture near the source of raw materials, arrangements were made for the Dow company to produce the future requirements of "Thiokol" exclusively for the Thiokol Corp., which recently moved its general offices and laboratory from Yardville to Trenton, N. J. Molding powders will be produced in a small plant adjoining the Trenton headquarters where "Thiokol" will be received from Midland and converted into powder form.

All development or sales activities will be conducted from the Trenton offices of the Thiokol Corp.

Product and Process Changes

Formerly, in the production of "Thiokol," the reaction was carried out in large open tanks, the "Thiokol" forming a huge flat biscuit, eight feet in diameter and 18 inches thick, which had to be cut and milled into sheets. In the new plant the process, as described below, has been completely mechanized, and the finished product is in the form of crumb-like non-adherent particles.

Figure 1 is an external view of the new Dow "Thiokol" plant, showing the sodium polysulphide storage tanks at the extreme left, and ethylene dichloride storage tanks at the extreme right. The center tanks are for storing other processing chemicals. As a preliminary step, sulphur and other materials are reacted to form sodium polysulphide which is pumped through a filter to outside storage tanks.

The "Thiokol" process is started by introducing the polysulphide and ethylene dichloride into the reacting tank No. 11 shown in Figure 2 (left). The operator of this reacting tank controls the temperature by the addition of the reacting materials (Figure 3). The product formed is "Thiokol" latex (Figure 4), which is transferred to the washing tanks Nos. 12 and 13 (Figure 5). After the latex is thoroughly washed by agitating it with water, the latex is transferred to tanks Nos. 15 and 16 (Figure 6) where it is coagulated by the addition of sulphuric acid from

Fig. 3. Controlling Temperature of Reaction

at Midland, Michigan

tank No. 17; the rate and the particle size are governed by the addition of acid. The coagulated latex is discharged into the filter box (Figure 7) where it is again washed. The pipe elbows and nozzles shown on the filter box are used for introducing water to wash the coagulated latex. It is then filtered and fed into squeeze rolls at the wet end of the drier. The finished "Thiokol" is carried through the drier on a continuous belt (Figure 8) and discharged into drums as shown at the extreme right in Figure 2.

Advantages of New Process

As the new process is largely automatic in operation and adapted to close control, the "Thiokol" produced has a high degree of uniformity. The product in its final form consists of crumb-like particles which tend to keep their identity when packed and stored in containers. In this form the "Thiokol" can be more conveniently handled by users than was the case with the former sheets, but can be readily milled into a coherent mass.

Fig. 4. "Thiokol" Latex

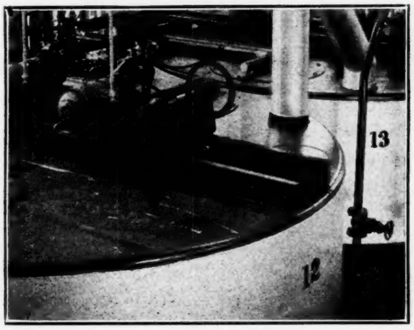


Fig. 5. Washing Tanks

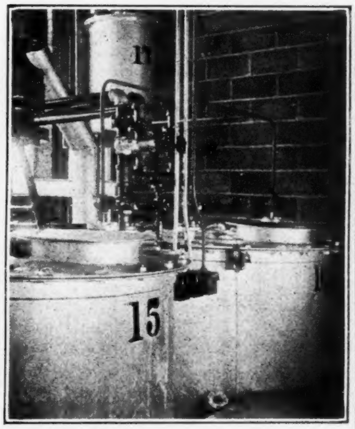


Fig. 6. Coagulation and Acid Tanks

Fig. 7. Filter Box and Squeeze Rolls

(Left) Fig. 8. Continuous Belt Drier and Finished Product

IT HAS RECENTLY BEEN REPORTED THAT "THIOKOL" HOSE has contributed to the efficiency of the Davis Combustible Gas Indicator, an apparatus for automatically testing air conditions in subterranean chambers. "Thiokol" hose was chosen for this purpose because, in addition to being tough and flexible, it is unaffected by a wide variety of solvents and gases.

The Use of Rubber in Furniture[1]

THE subject of the utilization of rubber in furniture is a very interesting topic, and there is no doubt that the successful application of this commodity in one form or another to chairs, mattresses, and other forms of furniture offers a very big outlet for the use of rubber. The following describes some of the more important types of rubber at present obtainable for use in furniture and indicates some of the progress which has been made in this field.

Constructional Details of Furniture

The advantages of rubber covered steel instead of wooden and even chromium-plated steel for furniture construction can briefly be

Ebonite Articles Inlaid with Soft Rubber, Precious Metals, Etc.

enumerated as follows: freedom from scratching, non-rusting, non-tarnishing, prevention of damage to other articles with which the furniture comes in contact, non-denting, and ease of cleaning. The surface could no doubt be polished to simulate a varnished effect if desired.

Rubber has been used in the form of ebonite for chairs, tables, picture-frames, wall-paneling, etc.; the ebonite for chairs is either the solid variety or used as a decorative covering for the wooden frame members. A process developed some years ago involved the use of soft rubber, precious metals, mother-of-pearl, and other materials in conjunction with ebonite for such articles as table tops, coffee tables, and plaques.

Apart from chairs, rubber has been used as a covering material for tables and sideboards and as a lining for trays. Rubber has also been used as a wall-paneling, and it is possible that this idea could be developed still further by covering cheap wooden shells with rubber or ebonite for use in the construction of wardrobes and cupboards. One rubber manufacturer has already suggested that wardrobes and other furniture for nurseries might be made from boards of expanded rubber, where its lightness would be an advantage.

Reference should undoubtedly be made to the use of rubber as a

Ebonite Table and Chair

surfacing for doors and as a draught and noise seal. One firm has developed a completely rubber covered door. The center of the door is covered with $\frac{1}{16}$-inch rubber sheeting, and a patent edging is applied in four pieces with joints at the sides and not on the corners. Thus full protection is afforded at the top and the bottom corners. The door presents a pleasing appearance, and a very important feature is that there is no paint or other surface finish to damage when furniture is being moved through the doorway. Other developments are the replacement of wooden door jambs with extruded rubber strip and the use of sponge rubber cushioning for the edges of swing doors. The sponge is covered with a $\frac{1}{16}$-inch thickness of rubber sheeting. In the latter case the use of rubber, besides eliminating draughts, does much to prevent fingers being hurt if accidentally caught in the doors.

Rubber is being used on the legs of furniture to prevent noise, slip, and vibration. Some form of rubber strip could with advantage be used on tables and other furniture having sharp corners. The use of rubber strip has been suggested for attaching to the inner edge of a cane-bottom chair seat frame

Courtesy Heal & Son, Ltd.

Chair with Lattice-Work Rubber Seat and Back

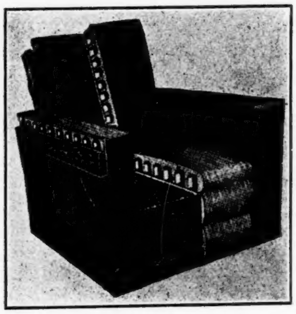
[1]Data and photographs from *Bull. Rubber Growers' Assocn.*, Sept., 1937, pp. 450-70.

to prevent the chair cutting through the cane. Certain advantages are offered by the use of rubber strip to form a seal, preventing ingress of dust and moths into wardrobes, drawers, etc.

"Sea-Esta Chairobed" Collapsible Chair

Suspension Systems

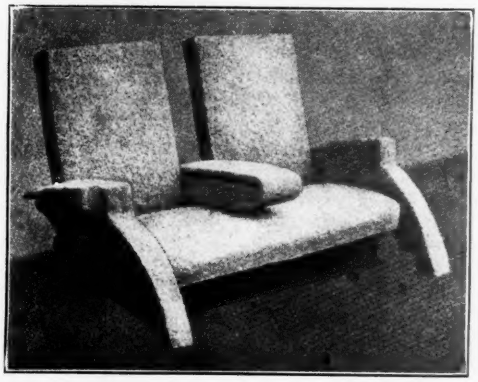
Many years ago tests were conducted with rubber diaphragms for use as car seatings. These tests showed that the rubber sheeting insured an even distribution of pressure on the body, and in addition it gave an increase in vertical deflection, thus absorbing blows otherwise transmitted through to the passenger by rough road surfaces. A further advantage was the fact that, under load, the seat became "hammock-like" and thus counteracted any tendency to rolling or side sway. A subsequent development of this idea was the use of strips of rubber in a somewhat similar manner to ordinary canvas webbing. The great advantage of the rubber slatting system as applied to automobiles is that the shallow seat obtainable by its use allows ample headroom. The rubber strip idea was developed still further for light mattresses for nurseries so that children could rest on them during the daytime.



"Dunlopillo" Cushioning for Domestic Upholstery

A modification of the rubber strip system is to utilize elastic rubber cords as a means of supporting the cushioning. The comfort of a chair is very largely bound up with two main considerations. The first is to reduce the impact load caused by the body coming into contact with the seat, and, second, the seat should take the shape of the body in contact with it and support it in a comfortable position. It is claimed that in this respect rubber cords are superior to many other forms of suspension. The elastic cords are made of multiple strands of rubber thread covered with a highly polished, good wearing cotton, and the extensions which are obtained are much higher than those obtained for steel springs.

Several patents have been taken out for the use of rubber cords for suspension systems, covering chiefly the method of fixing to the frame. One of the systems utilizes the cords in conjunction with sponge rubber cushioning. In another method elastic cords are used with coiled metal springs in a state of tension. The object of the elastic cord, which runs through the middle of the coiled metal spring, is to prevent damage to the metal spring if a heavy load is applied to it, so that it is stretched beyond the elastic limit. Another use of rubber is its application in the form of a solution to coiled springs before they are inserted in position. Thus some of the padding material adheres to the springs and reduces the tendency of the padding to work loose and become lumpy.

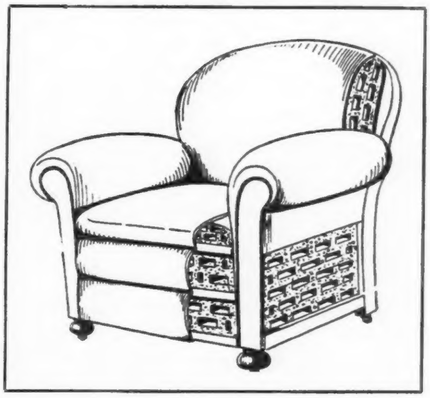


Application of "Hairlok" to Motor Car Seating

Stuffing Materials

Among the new garden and beach furniture is the "Sea - Esta" beach chair which consists of a combined seat and back unit of inflated rubber connected by means of a strap to form, in the deflated condition, easily portable seats. In another form ("the Sea-Esta Chairobed") a full-sized bed can be instantly converted into a comfortable chair for use in the garden or on the beach by connecting the two halves by means of a strap.

Air cushions and mattresses, while somewhat satisfactory in service, have had the disadvantage of a tendency to rolling. This defect is effectively overcome by the "Float - on - Air" upholstery in which the air tubes are specially arranged so that they lie in folds within an outer covering. The folds run from the front to the back of the seat, and weight is evenly distributed by the tubes so that complete support is given with surprisingly low air pressure. This upholstery includes mattresses for use in hospitals and ambulances, seats for automobiles, etc. A recent patented development is the use of this pneumatic cushioning in combination with a sponge rubber base.



Chair Upholstered with "Sorbo" Sponge Rubber

In another form (the "Saco" system) rubber pillars are placed at intervals inside the air bag. The pillars are hollow, open at each end, and enable the cushion to keep its shape under load. By providing separately inflatable parts, varying degrees of softness can be obtained in this type of cushion.

The three main types of sponge rubber for upholstery purposes in use today are cushions filled with loose pieces of sponge, ordinary sponge rubber built up or molded to the required shape, and sponge made from latex by the molding process.

The first of these types is used to some extent for loose cushions

for cars, sports grounds, etc. Ordinary sponge rubber sheeting was later adopted, and this was followed by the built-up type of seat construction. The latter resulted in extremely comfortable furniture, but it was heavy and costly. This strip system of construction, while still in use, has tended to give way to simplified forms of construction, for example "Sorbo" rubber sheets which are perforated, slotted, or with holes of other shapes on the under side. The cushions can be either molded or built up with the openings at regular intervals or so that the openings only partly coincide, resulting in the cavities having a staggered formation. Other forms have sponge rubber sheeting with internal members also of sponge rubber, introduced to form a "girder-like" construction with the air recesses of various shapes and disposed in different places.

In another form molded "Sorbo" rubber cups are used to replace steel springs; the cups are covered with a topping also made from sponge rubber.

During the past few years much steady progress has been made in the production of the molded latex sponge cushioning material, "Dunlopillo." This process consists in whipping a latex mixing to a froth, pouring the froth into molds, fixing by means of a setting agent, after which the sponge unit is vulcanized. Cushions of an infinite variety of shapes and sizes can be produced quickly and comparatively cheaply, once the necessary molds are available. A refinement in the method of manufacture allows for the production of cushioning or mattresses having graded properties. Thus the lower portion of the cushioning can be made of a mix, giving, when vulcanized, a relatively dense sponge material, the top being of a lighter or softer type.

When used in furniture, this type of cushioning gives a luxurious sense of comfort; it is moth-proof, hygienic, and, by reason of its cellular nature, air circulates through it, preventing heating.

Another form of sponge rubber cushioning is composed of sponge rubber sheet constructed into a bell-like form, each of the "bells" being connected to others at their bases, ventilation holes being provided and the whole seat covered in the usual way. In another patent it is proposed to overcome the necessity of molding by cutting up unvulcanized or partly vulcanized sponge rubber sheeting to the approximate size required, roughly assembling, and vulcanizing in open steam. Sponge rubber units having cavities on the underside are also used in conjunction with coiled steel springs, each of which fits into one of the cavities.

A form of upholstery material which has become of great importance is a rubberized hair material manufactured in England under the name "Hairlok" and in America as "Hairlok" or "Nukraft." This type of cushioning is made by coating hair with latex and molding the treated hair to the desired shape. On being vulcanized, the individual hairs become locked to each other, to form a cushioning material giving a high degree of comfort and capable of keeping its shape almost indefinitely. The material is produced in the form of loosely matted hair pads, hair tubes, half tubes, and in other shapes. It is also available in long rolls from which the user can cut all types of shapes and sizes. All these forms of rubberized hair provide cushioning having resilience combined with lightness in weight. They are vermin-proof, have a long life, and require only unskilled labor in constructing the furniture.

In a recently granted patent rubberized hair is combined with spongy rubber for upholstery purposes. Other patents specify the use of latex in conjunction with cotton-wool, cork, etc. to form upholstery materials.

Upholstery Fabrics

A process now being developed utilizes new leather cuttings reduced to their constituent fibers, after which they are combined with latex. The finished material, sold under the name "Salpa" leather, is available in a large range of colors and grains and can be grained, finished, sewed, skived, and pared in the same manner as leather.

Another development is the production of imitation suede material by dusting finely divided cotton-wool, leather, or similar materials on to a surface made sticky by the use of rubber. In still another process cotton linters and other types of fibrous materials are impregnated with rubber to produce upholstery materials.

Much progress has been made in the application of rubber to furnishing fabrics such as mohair. One of these products is "Velmoda," which consists of short thick mohair velvet pile set into a rubber base. It is claimed that the rubber prevents moisture and dust penetrating to the padding material and that it can be washed with soap and water without detriment to the fabric. Also, it is said to be economical; the cut edges do not fray; joints can be effected invisibly; and it does not sag or pucker. A similar material, "Wulatex," is composed of wool and latex. This material is said to be waterproof, dustproof, non-sagging, and is especially suitable for automobile furnishings.

From this brief survey it will be apparent that the various applications of rubber referred to afford an opportunity for quite a considerable expansion in the demand for rubber.

Vulcanization of Rubber

(*Continued from page 39*)

ment. There are reactions other than those discussed here which might form cross bonds just as there are other methods of vulcanizing rubber.

While the known facts seem to fit into the general scheme outlined here, much remains to be done before the theory can be accepted as more than a working hypothesis.

Synthetics

The bearing of these ideas on the vulcanization characteristics of some of the newer synthetic elastics is evident if we consider their probable molecular structure in relation to that of rubber.

Polyisobutylene, a saturated hydrocarbon, does not undergo the vulcanizing reactions characteristic of rubber. Neoprene, on the other hand, is similar to rubber and does undergo vulcanizing reactions like those of rubber, but modified by the presence of the chlorine atom in place of the methyl group.

Less obvious, but equally important is the application of this theory to paints and synthetic resins. The hardening of drying oils and the conversion of heat hardening resins are examples of changes similar to the vulcanization of rubber. There must be an underlying similarity in the types of reactions which will cause these changes and in the types of materials which will undergo them. The concepts presented here indicate what this similarity is and have, indeed, led to: the synthesis of new types of vulcanized resins; the vulcanization of hitherto unvulcanizable resins; and to the synthesis of new types of paint vehicles.

Apparatus for Evaluating Puncture Resistance[1]

H. H. Bashore[2]

IN THE development of improved compounds for products such as tires, inner tubes, conveyer belts, and hose, the need was felt of a quick and accurate test which would approximate the puncturing conditions these goods might receive in service. For such a test an apparatus was developed which provides for a puncturing pin to be pulled through the rubber sample, the pulling force being supplied by a vertical Scott tensile tester. The adaptation to the Scott machine (Figure 1) eliminates the necessity of additional load-recording and extension-pulling apparatus.

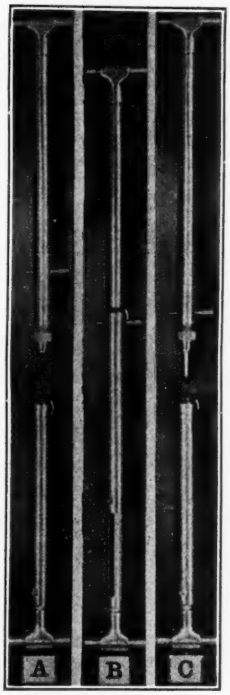


Fig. 2. Three Positions during Operation

Construction

The test apparatus, of which three views are shown in Figure 2, is composed of two sections. The top section is a hollow tube through which the puncturing pin (Figure 3A) travels downward in puncturing the sample (Figure 3B), which is gripped firmly at the periphery between an internal shoulder on the tube and a sleeve (Figure 3C) within a threaded cap (Figure 3D) which screws on to the tube. Distortion of the test piece, while the screw cap is being tightened, is prevented by the inner sleeve which presses vertically against the specimen while the turning action is taken up by slippage between the sleeve and the cap. A horizontal pin is attached to the vertical puncturing pin to provide means for attaching the bottom tube section which pulls the pin downward. The hollow tube of the top section is slotted to allow vertical movement of this horizontal pin.

Fig. 1. Apparatus Attached to Scott Tester

The bottom section consists of two members, a hollow tube, and an inner rod slotted to permit vertical movement of a horizontal pin permanently fixed in the tube so as to enable free relative movement of the two sections when changing test specimens. The top of the hollow tube has a slotted hook arrangement which attaches to the horizontal pin of the top section. Both sections are provided with means of attachment to the pulling members of the Scott Tensile Machine. The weight of the top section is equal to the weight of the regular top clamp used in tensile tests, thus obviating correction of the dial reading.

A circular sample, ¾-inch in diameter and died out of the usual laboratory slab, is used for the test. In order to achieve a high-scale reading of the pulling force required and therefore greater accuracy, many tests were made to determine the proper included angle of the point to be used to cause puncture. With test specimens 0.065-inch in thickness or under, an included angle of 90 degrees was found to be quite satisfactory. However, with the usual specimen thickness of 0.100-inch, the angle is limited to 45 degrees.

Operation

Referring to Figure 2, position A shows the apparatus before test with the cap containing the test specimen tightly in place. The slotted hook of the bottom section is then attached to the horizontal pin of the top section, as shown in position B. The tensile machine is started, and with this sliding tube arrangement the puncture pin is pulled down through the rubber specimen. Position C shows the apparatus after test with the bottom section lowered and the puncture point protruding through the cap. The entire test can be conducted in 45 seconds by a skilled operator.

The load or resistance to puncture is recorded on the dial of the Scott tester. By means of graduations on the top section and a feather edge at the upper end of the lower section, it is possible to obtain the deformation of the specimen at any point in the test. The degree of deformation at puncture is read when puncture is indicated by a popping sound. For calculation to a standard basis for comparison, it is assumed that the puncture resistance per inch of thickness equals the breaking or puncture load divided by the thickness of the test specimen.

Fig. 3. Puncturing Pin Assembly and Sample

Utility of Test

There is in use at present a wide

[1] Published with permission of C. P. Morgan, chief chemist, Vulcanized Rubber Co., Morrisville, Pa.

[2] Assistant to the chief chemist, Vulcanized Rubber Co.

variety of tests for the evaluation of the physical properties of rubber compounds. In order to determine the relation, if any, of puncture resistance to standard physical tests, a series of compounds of widely different nature was tested for: tensile, elongation, hardness, resilience, and puncture resistance. The five compounds tested were as follows: compound A, tire tread or belt cover; B, resilient pure gum; C, red sheet packing; D and E, oil-resisting hose tube stocks containing synthetic rubbers. All tests were conducted at 70° F. on samples of optimum cure. The table in the next column shows the test results.

It is apparent, within the limited scope of these five compounds, that puncture resistance as measured by this test bears no direct relation to the other physical properties, indicating that the new test will serve a definite purpose in evaluating resistance to puncture.

Compound	A	B	C	D	E
Tensile Strength ..	5,000	4,250	1,100	1,000	1,750
Elongation at Break	700	775	350	600	450
Shore Hardness (Type A Durometer)	60	45	75	75	75
Resilience* at 70° F.....	58	70	42	49	22.5
Puncture Resistance per inch of thickness ..	525	360	460	515	880

*Using improved rebound resiliometer described in *Rubber Chem. Tech.*, Oct., 1937, pp. 820-26, the original form of which was presented in INDIA RUBBER WORLD, Mar. 1, 1937, pp. 37-38, 51.

Another possible use for the apparatus is the measuring of rate of cure. To indicate its application for this purpose, tests were taken on one compound. Figure 4 shows the puncture resistance of compound A plotted against the time of cure.

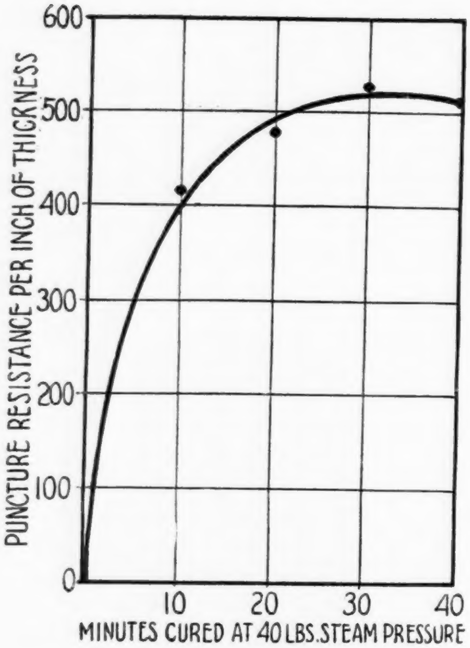


Fig. 4. Puncture Resistance vs. Time of Cure (Compound A)

Pioneers of Employe Security[1]

William G. Marshall[2]

WITHOUT insistence of government or pressure from organized labor, industry long ago was proceeding toward fair solution of the problems of employer-employe relations. More than a generation ago enlightened industrial leaders quietly began making working conditions more comfortable and the future more secure for employes. Plans for "profit-sharing" and "social security," restricted and less liberal forms of which are now being incorporated into the laws of the nation and many states, had their real origin in the work of these men.

A study of representative nation-wide companies, including United States Rubber, United States Steel, Bethlehem Steel, International Harvester, Standard Oil of New Jersey, American Telephone & Telegraph, General Motors, and Westinghouse Electric & Mfg. Co., showed that some or all of these companies had:

Successful pension plans from as far back as 1908;

Group life insurance since 1915;

Vacations with pay for both wage and salary employes from 1913;

Profit-sharing plans in one form or another since 1919;

Unemployment insurance from 1930;

Separation allowances from 1925;

Savings and thrift plans from 1924;

Collective bargaining from 1919.

In view of this record, industry is right in protesting the notion and innuendo "that all that is good and worthwhile has been, in all cases, forcibly drawn from an unwilling obstinate and reactionary management; and that all that is undesirable and worthless; wages and hours and working conditions that are unfair and unjust, have been forced upon a defenseless generation of workers."

Industrial management is not protesting against the principle of labor organization. It is not protesting against establishment of hours and working conditions determined after careful study. It is not protesting payment of the highest wages commensurate with what is possible in the industry, and in tune with economic conditions.

Industry is, however, protesting the theory and the assumption that the very foundation of the working relationship between a workman and the man by whom he is employed is founded upon strife and conflict.

For two years now, demands and counter-demands for wages, hours, and working conditions have been front-page news. The public thinks of working conditions in terms of light, heat, sanitation, safety, and often ignores the importance of such other benefits as retirement plans, group life insurance, vacations with pay, profit sharing and wage incentive plans, unemployment insurance, savings and thrift plans, and collective bargaining.

Has the public been properly informed of the comprehensive and successful plans that have been quietly operating among millions of workers for more than a generation? It would seem that industry had left all this to those who believe they have something to gain by capitalizing on it as of very recent origin.

What do employes want? As a rule they want industrial peace and an opportunity to work on friendly terms with their employers. They do not want philanthropy or pa-

(*Continued on page* 53)

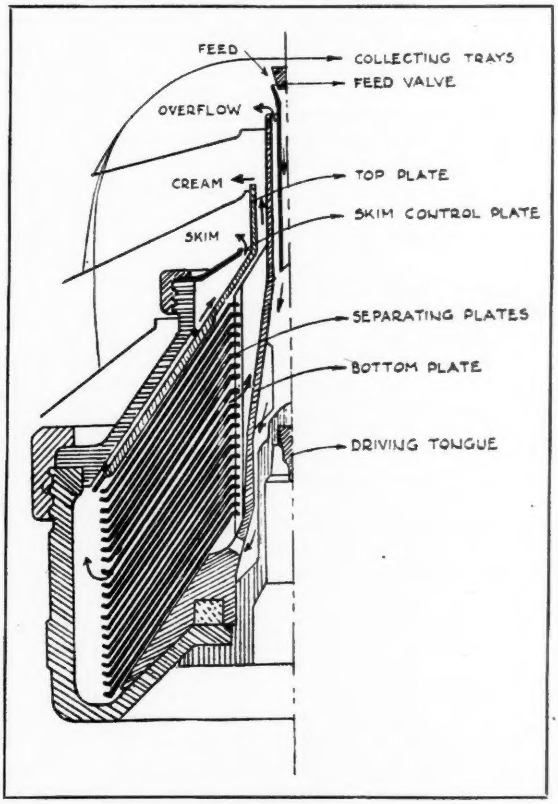
[1] From a recent talk at Miami, Fla., before the Committee of 100, a group of representative business men and industrialists.
[2] Vice president, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Centrifugal Concentration of Latex[1]

J. H. Piddlesden

LATEX imports into the United States for 1937 showed a 400% increase over the 1931 figure. As there has arisen a demand for a concentrated latex of uniform quality, interest in concentration processes has been stimulated. The following article emphasizes some of the more important problems encountered in the centrifugal method. EDITOR'S NOTE.

THE concentration of latex by the use of a centrifugal machine of the cream separator type was patented by Utermark in 1923, and from that date there has been a continuous commercial and technical development of the process. Although latex bears certain similarities to milk, in that they are both emulsions, and in each case the lighter disperse phase has a somewhat similar density and particle size, latex has proved more difficult to separate into cream and skim fractions and has necessitated the development of special machines for the purpose. As would be expected, these machines are largely modifications of the cream separator.



Diagrammatic Section of Half-Bowl

Design

The centrifugal machines commonly used consist essentially of a bowl of approximately 10 inches diameter, rotated at 6,000 to 8,000 revolutions per minute. The interior of the bowl, as shown in the illustration, is filled with a pile of conical plates between which are narrow gaps. The latex is introduced at the bottom of the bowl by a central feed tube and ascends through perforations in the plates. As the latex passes up through the plates, separation occurs, owing to centrifugal force, and the portion richer in rubber passes up through the gaps between the plates, toward the center of the bowl. The fraction containing less rubber passes down through the gaps in the opposite direction. It then rises through the annular space between the edge of the plates and the bowl. Both streams are brought back to concentric spaces round the feed tube and discharged at different levels into collecting trays.

Stabilizers

It is necessary to add some form of stabilizer to the latex to prevent coagulation in the bowl and, subsequently, to keep the concentrate fluid. Many substances have been tried, but ammonia appears to be the only successful one in common use. It has the following advantages:

(a) It will keep latex in a fluid condition and free from putrefaction almost indefinitely.

(b) It reduces the viscosity of the latex.

(c) It is completely volatile and leaves no harmful solid residue in the finished rubber goods made from the concentrate.

(d) It is comparatively cheap.

(e) It is easy to use as it is bubbled into the latex in the form of a gas.

The disadvantages of ammonia are that it imparts an increased corrosive action to the mixture and renders the skim difficult to dispose of economically. It has been found in practice that 0.2% of ammonia is sufficient to prevent coagulation and to provide a viscosity low enough for centrifuging provided that the latex is passed through the machine within 24 hours of collection and preservation. Larger quantities do not appear to facilitate the separation. Table 1 gives comparative results obtained with identical machine settings on latices containing different amounts of ammonia. When such small initial quantities of ammonia are used, it is important that more ammonia be added to the concentrate as soon as possible after its production. The quantity necessary for prolonged preservation of the concentrate is 0.5%.

Operation

The object of centrifuging is to obtain a concentrate containing at least 58% of rubber. A skim fraction is inevitably obtained as a by-product, and this is an important factor in the commercial consideration of the

[1] Abstracted from *J. Rubber Research Inst. Malaya*, Apr., 1937, pp. 169-78.

TABLE 1. CENTRIFUGAL CONCENTRATION OF LATICES WITH VARYING AMMONIA-CONTENTS

Feed					
Age Days	D.R.C. %	NH_3 %	Cream D.R.C. %	Skim D.R.C. %	Efficiency* %
0	34.9	0.13	58.1	9.7	86.1
0	34.8	0.15	57.7	9.5	88.0
0	33.9	0.32	60.2	9.5	86.4
0	35.8	0.28	57.7	13.0	83.6
1	29.2	0.33	60.1	13.1	70.5
1	36.0	0.27	61.1	14.4	79.5
0	34.4	0.58	57.9	10.5	81.7
0	33.8	0.58	60.2	11.5	81.1
1	33.4	0.62	59.9	15.9	71.1
1	34.8	0.58	60.9	13.7	78.8

*"Efficiency" is the proportion of the total rubber in the cream fraction.

process. The ideal would be achieved if the rubber content of the skim were low enough to make recovery uneconomical. At present it appears to be impossible to achieve this ideal. It is obvious that the larger rubber particles are those most readily separated from the serum; hence, when partial separation has occurred, the rubber remaining in the serum is in the form of extremely fine globules. To remove these from the serum would require a greatly increased separating force.

Tests with Machines at the Institute

Two types of machine have been tested experimentally in the Rubber Research Institute. The first was a very small laboratory model in which quantities of the order of one gallon of latex were treated per run. The feed rate was controlled by the provision of interchangeable jets, and the skim passages contained grub screws by which they could be obstructed to a varying degree. The best average setting giving a reasonably high throughput-rate gave cream of 54% together with skim of 14% dry-rubber-content.

The second type tested was a full-scale machine capable of treating 60 gallons of latex per hour. This had independent adjustments for the cream and skim outlet channels. The latter took the form of a series of interchangeable disks, by means of which the size of the annular aperture through which the skim was discharged could be varied. A larger aperture increased the proportion of the total volume discharged as skim and its dry-rubber-content. It also increased the throughput-rate of the machine. The adjusting devices provided for the cream-outlets consisted of nozzles screwed through the neck of the top plate. They could be set to project for different distances into the gap between this neck and the overflow-tube. Thus, as the cream ascended through this annular space, it could be drawn off at varying distances from the center of the bowl. The feed-rate was controlled by a needle valve. These settings were interdependent in the sense that any alteration to the cream settings, designed to give a richer cream, gave simultaneously a richer skim and vice versa. It was thus possible to obtain a rich cream, or a low skim, fairly readily, but attempts to produce both at the same time were not very successful. Table 2 gives a typical selection of results illustrating these points.

TABLE 2. CENTRIFUGAL CONCENTRATION OF LATEX: VARIATIONS IN THROUGHPUT, CONCENTRATION OF CREAM AND SKIM, AND EFFICIENCY

No.	Throughput (Gals. per Hour)	Cream D.R.C. %	Skim D.R.C. %	Efficiency* %
1	66.3	51.1	6.0	95.5
2	62.5	61.4	12.3	76.5
3	53.0	52.9	7.0	95.4

*"Efficiency" is the percentage of the total rubber which appears in the cream fraction.

One of the main reasons for the difficulty in obtaining simultaneously a rich cream and a poor skim is almost certainly the rapid increase in viscosity which occurs with increasing concentration. Table 3, due to Rhodes,[2] illustrates the magnitude of this factor.

TABLE 3. DRY-RUBBER-CONTENT AND VISCOSITY OF LATEX

D.R.C. %	*Viscosity (Centipoises)
30.2	3.46
55.9	23.72
60.9	51.94—Normal Concentrate
66.2	159.50
67.9	557.60
70.8	2160.00

*These results were obtained on latex concentrated by filtration. This method of preparation gives a concentrate similar to that produced by a centrifugal machine.

The upper limit of concentration has been stated[3] as 73% total solids, at which the latex practically ceases to flow. Another author[4] states 67% total solids as the approximate upper limit for a centrifugal machine. Any increase of the dry-rubber-content of the cream leads to a reduction of flow in the concentrate passages inside the bowl. This in turn causes increased separation by keeping the material in the bowl for a longer time. Thus the passages soon tend to become filled with a thick buttery cream, and frequent cleaning is necessary. In the large machine used in these experiments attempts to produce cream with a rubber-content appreciably above 60% caused rapid choking. Also, in attempting to produce cream of not less than 60% rubber, together with skim of less than 8% rubber, it was necessary to reduce the feed rate to 30 gallons per hour, which again caused rapid choking.

The best average setting for the machine gave cream containing 60% together with skim containing 10% of rubber, when latex was fed in at the rate of 50 gallons per hour. Under these conditions equal volumes of skim and cream were produced, and the latter contained 86% of the total rubber. Even with these settings the throughput began to fall off after the machine had been run for less than half an hour, and 80 gallons was the maximum quantity which could be treated before choking with thick cream made dismantling for cleaning necessary.

Attempts were therefore made to develop an alternative method of operation. By increasing the feed rate or reducing the bowl speed a lower separating force was applied, and a satisfactory cream could be produced with less risk of over-concentration and choking of the passages. In this case, however, a much lower proportion of the total rubber was obtained as concentrate, and a large quantity of fairly rich skim (dry-rubber-content 15-20%) was produced. At first sight this presents the attractive possibility of being able to produce at one and the same time a latex-concentrate and a skim of a consistency suitable for the manufacture of sheet rubber. This was not realized since the skim from centrifugal concentration does not lend itself to the manufacture of first quality rubber.

Recovery of Rubber from the Skim Fraction

A skim fraction containing 6 to 8% of rubber differs from normal latex diluted to a similar dry-rubber-content in that the average size of the particles is much smaller; it contains ammonia, and it also contains a very large proportion of the non-rubber constituents of the latex from which it was made. Each of these factors tends to make coagulation difficult and expensive, particularly if an acid coagulant is considered. The use of magnesium chloride and silicofluoride as a coagulating mixture gives better results,[5] but even when this is used, a coagulum suitable for the manufacture of normal smoked sheet is very difficult to obtain. Such coagulum can, however, be made into crepe with less difficulty. In practice, although the machining cost is higher, crepe is probably submitted to a more effi-

[2] E. Rhodes, private communication.
[3] "Chem. Engineers' Handbook," Perry (1934), A. E. Flowers, p. 1534.
[4] R. J. Noble, "Latex in Industry," *Rubber Age* (*N. Y.*), 59 (1935).
[5] J. D. Hastings, *J. Rubber Research Inst. Malaya*, 5, 351 (1934).

cient washing than is the case with sheet, and a large proportion of the water-soluble serum constituents is thereby removed.

Commercial Practice

The present trend of machine design and published information on the process both indicate that the usual object is to produce the maximum quantity of cream of suitable rubber-content, while regarding the production of skim as a necessary evil. For example, Noble[4] states that a serum containing 6 to 8% rubber is generally desirable on estates and quotes an analysis of the products of centrifugal concentration which is presumably typical of modern commercial operation and from which the following figures were culled:

	Skim %	Concentrate %
Total Solids............	11.0	61.5
D.R.C.	7.1	60.0

Assuming that normal latex of about 35% dry rubber content was the starting material, these figures indicate that the resulting cream formed slightly over half the volume of the initial latex and contained roughly 90% of the total rubber.

These results are superior to those obtained with the machines tested by us which were of types not in general use. The differences in performances, therefore, are probably due to modifications of machine design. It would appear from recent patents that the object of designers is to produce a machine of high separating power in which choking is overcome by a special arrangement of cream passages.

Materials of Construction

It is well known that latex preserved with ammonia exerts a corrosive action on most metals. The ideal material for the construction of a centrifugal machine for latex concentration is stainless steel. Unfortunately it is expensive. Steel may be used as a compromise, but great care should be exercised to insure that no part which comes in contact with the latex is constructed of copper or brass, or even of either of these metals coated with tin, since the protective film very soon wears off under the combined action of corrosives and frequent cleaning.

Acknowledgments

The tests on the smaller machine referred to above were carried out by A. Moore, and the writer is indebted to him and to Dr. E. Rhodes for their advice and help in the preparation of this paper.

Plastics

(*Continued from page* 42)

rene, a colorless liquid, by the process of polymerization with or without catalysts. Its physical properties are largely determined by the conditions under which it is polymerized. It may be made so as to be extremely tough or quite brittle as desired. Polystyrene is chemically inert and has remarkable electrical insulating properties, its dielectric losses being superior to those of porcelain and vastly superior to other resinous insulating materials. It also has good resistivity and dielectric strength. Its softening point is about 10° C. higher than that of the usual hard rubber. It will retain its shape in the molded piece up to 110° C. unless external strain is applied. Polystyrene, being itself colorless and transparent, can be easily colored to any desired tint. It is well suited for dentures and, on account of its excellent electrical properties, for radio parts and similar applications.

Casein Plastics

Casein plastics are made from the casein obtained from milk, and after the plastics are pressed into sheets or rods they are cured or seasoned in a formaldehyde solution. The sheets or rods are then dried and straightened. Casein products are somewhat hygroscopic, and pieces larger than four inches square are likely to warp. The most important use of the casein is for small articles where color, appearance, and durability are the first considerations. The material can be machined readily and takes a fine and lasting polish. Its principal use in this country is for buckles, buttons, slides, and accessory trimmings, and to some extent in the manufacture of electrical equipment and appliances.

Patent Legislation

(*Continued from page* 43)

him by the Commissioner of Patents, the latter may grant a compulsory license to any applicant.

Granting of License

SEC. 6. At the hearing provided for in section 5 to determine whether such license should be granted if the applicant, and the Commissioner of Patents shall decide that such a license should be granted under the application, such license shall be granted for a term of years not to exceed the duration of the life of the patent.

Appeals

SEC. 7. If the patentee should consider the decision of the Commissioner of Patents unfair with respect to the amount of royalties or any other conditions he may set under this Act, then the patentee shall have the right of appeal within 30 days thereafter to the United States Court of Customs and Patent Appeals, or to the United States district court of the residence of the owner of the patent.

Pioneers

(*Continued from page* 50)

ternalism, and they will not sacrifice their independence. It is to meet these desires that enlightened employers are working.

We cannot help but commend the foresight of those executives who have pioneered in better employer-employe relations, those companies that have been willing to devote attention and to contribute intelligence and money to the development of employe plans, the general underlying principles of which are now being given national legislative attention.

While these matters still present great problems, it must be a source of extreme satisfaction to such organizations to have back of them a history of considerably greater liberality than that now established by law.

Editorials

Compulsory Licensing of Patents

BILL H. R. 10068, proposed in the House of Representatives, is published in full on page 43 of this issue. At any time after the expiration of five years from the date of issuance of a patent any person or number of persons may request a license from the Commissioner of Patents. To obtain consideration, when unfair, insufficient, or no use of the patent has been established, the only requisites from the applicant are evidence of financial responsibility and ability to manufacture such patented articles, a statement that the public interest will be advanced by the issuance of the license, and a specific offer as to royalties, terms, and conditions.

If the license is granted by the Commissioner, there is no positive assurance that manufacture will be instituted or continued except as may be specified in the terms which are to be approved by others than the patentee. The burden and expense of compelling the licensee to fulfil his contract will rest upon the patentee. In no way other than as a petitioner before the Commissioner of Patents and within 30 days from issuance of compulsory license by appeal to the United States Court of Customs and Patent Appeals, or to the United States district court can the patentee influence the number or selection of licensees and then at his own expense. This bill, if enacted, would violate the American right of free contract and self-determination as to those with whom the patentee would enter into a business transaction.

Publication for four consecutive weeks in the official patent gazette and a notice by registered mail to the patentee and to an attorney who at that time may even be dead will constitute evidence that the patentee is aware of the application for license, and the patentee must then take the initiative in presenting his views to the Commissioner. Any person other than the patentee and having an interest in the patent would be forced to have continual knowledge of the contents of the patent gazette as his only notification would be through its published columns.

The self-evident purposes of patents are: to reward, during a reasonable period, the inventor who in many instances has expended a large amount of time, effort, and money; to dispense to others information as to previously granted patents so as to avoid duplication of effort and expense; and, finally at the expiration of the preferential period, to make available to the general public the benefits of the invention.

If this bill becomes a law, inventors will, of necessity for self protection, work behind locked doors when perfecting their ideas and producing the finished product for market. Patent applications will decrease rapidly, and the interchanging of ideas between manufacturers of novel products will cease. Through the elimination of the incentive to seek a patent the full benefits of discovery will not be realized and inventive genius will be stifled, particularly in the case of those who must obtain their financial reward through the sale of a patent as there will be no commensurate market for patents.

Taxes and Wages

DURING the past calendar year one company dispersed $9,208,000 in wages and salaries to employes and $3,380,000 in government taxes. For every dollar expended for labor, 36.7¢ were paid to the government as direct taxes. This 36.7¢ per dollar of labor cost must be included in the cost of production and the selling price of the merchandise. If it were not required for taxes, more than one-third more men could have been put to work, and they would have produced more than one-third additional finished goods.

In an average manufacturing business the cost of raw materials and equipment is beyond the control of that company. Any reduction in cost of manufacture must for the most part come from lower per unit expenditure as wages or salaries. A well-managed company has great difficulty through improved methods or increased production per man-hour in effecting a lower labor cost of 5%. While some government taxes are always necessary, is it not reasonable to assume that, with strict economy methods in the use of government funds, a sizable portion of the present 36.7% of the labor cost could be made available for the employment of additional labor?

In the past it has been customary to subdivide manufacturing cost into material, labor, and overhead, the last item being, in a large proportion, salaries. Today the definition should be changed to read material, labor, overhead, and government expense. From a purely economic viewpoint the problem at hand becomes one of decreasing government cost and increasing labor expenditure. Putting more men to work through the transfer of industrial outlay from the government expense account to the labor account will create a sound economic condition, place the expenditure on a direct and efficient basis, and develop national morale, which comes from independent and gainful occupation.

S. C. Stillwagon

EDITOR

What the Rubber Chemists Are Doing

A. C. S. Rubber Division Activities

Meeting in Detroit

SUPPLEMENTING the preliminary report, published in our April issue, of the spring meeting of the Rubber Division, A.C.S., held in Detroit on March 28 and 29, further details are now presented.

Crude Rubber Committee Report

In the report submitted on March 28 by the chairman, R. H. Gerke, United States Rubber Products, Inc., Passaic, N. J., it was proposed that the tentative procedures developed during the last three years for testing the variability of rubber: namely, the A.C.S. recipe, determination of copper, and the determination of manganese, be adopted as standard at the next Rubber Division meeting.

It was also reported that the committee is in the process of formulating a procedure for the quantitative determination of dirt in rubber. Work done to date on the variability of plasticity has accentuated the necessity of the standardization of a method of sample preparation from a bale of rubber. In regard to testing the variability of normal and concentrated latex, tentative procedures L 1 to L 13 have been devised, and their publication will be effected. The committee announced that it has been receiving splendid cooperation from rubber producers. In this connection a letter has been received from H. J. Page, director of the Rubber Research Institute of Malaya, in which were listed six pertinent questions regarding uniformity reauirements.

In the discussion which followed, George Sackett, of Goodyear Tire & Rubber Co., Akron, O., described the present method of sampling crude rubber for acceptance against orders. Opinions as to the desire for uniform rubber indicated an urgent demand for uniformity as to cleanliness, color, plasticity, and rate of cure. There was the consensus of opinion among those present that a more uniform grade of smoked sheets is necessary and that active steps should be taken toward that objective.

George Haslam, of New Jersey Zinc Co., Palmerton, Pa., then showed a number of slides indicating the use of stress-strain curves and the T-50 tests as methods of evaluating the uniformity of rubber. Because the T-50 test results were more consistent in measuring the rate of cure, he recommended greater consideration of this method.

Use of Rubber in the Automotive Industry

At the morning session on March 29, five very pertinent talks on the use of rubber in automotive engineering were given by men well qualified through their active association with the production and adaptation of rubber for automobile design. Some of the more important points of interest to the rubber industry that were brought out are given below.

"Rubber from the Automotive Engineers' Standpoint." H. T. Woolson, Chrysler Corp. The outstanding property of rubber from the automotive engineers' point of view is its flexibility and ability to return to its original shape. Rubber is of great importance in reducing rattles, squeaks, and other elements of noise and rendering auto parts stronger and more flexible. It also reduces impact shock and fatigue and thereby increases the life of the automobile. The modern Chrysler car uses 280 rubber parts, weighing 186 pounds including fabric and metal.

"Rubber as Applied to the Engines and Chassis of Automotive Vehicles." Robert A. Plumb, Graham-Paige Motors Corp. Outlining the history of some applications, Mr. Plumb stated that the use of cylindrical rubber bushings in spring shackles has resulted in: a high degree of road shock and vibration absorption; reduction in volume of rear axle noise; and elimination of about a dozen lubricating points. Developments are now in process with a view to using rubber suspension systems to replace conventional leaf or coil springs. Rubber has also been found useful in connection with: shock absorbers, sway eliminators, front axle tie rod ends, kick shackles, and independent suspension units. Factors to be considered in the use of rubber in the chassis are: grade and volume of rubber, proper initial relation of parts, surface condition of retainers, degree of compression, etc.

The use of rubber in connection with the engine has been retarded by the high temperatures encountered and the presence of oil. However it is believed that swelling of rubber in oil is a definite advantage under certain conditions such as where expansion aids sealing. Synthetic rubber is used for a number of purposes where its properties make it particularly adaptable. It is well to bear in mind that the principal function of many engine gaskets is to maintain a 100% sealing contact and that pressure is not a factor.

"Adhesion of Rubber to Metal." J. D. Morron, U. S. Rubber Products. The adhesion of rubber to metal by means of brass plating depends upon four factors: (1) selection of metal to be brass plated; (2) proper plating; (3) compounding of the stocks for plating; and (4) processing methods. The general principles influencing the compounding of rubber for this purpose include: rubber should be well broken-down; sulphur should be at least 2 to 3%; proper accelerators should be selected; high temperature cures are preferable; reenforcing pigments have a positive effect; highly compounded stocks adhere better than soft gummy ones; the uniformity of adhesion is increased by the use of a cement; and adhesion increases with hardness. Mr. Morron gave a detailed description and presented motion pictures of the brass plating process.

"Developments in Automotive Rubber." H. A. Winklemann, Dryden Rubber Co. The wide range of properties of sponge rubber has led to its adoption in many auto parts; in addition to the standard types (molded and heater cured), there are latex sponge and the gas-expanded types. Deterioration caused by aging is the limiting factor in the serviceability of rubber goods. The failure of rubber, when exposed to atmospheric conditions, is dependent on: degree of dispersion, compounding ingredients, state of cure, conditions of exposure, materials which act as a protective coating, and the type of antioxidant and accelerator. Rubber under tension exhibits varying aging properties.

There is a need of a softening agent, effective in small amounts, that will result in softer stocks after vulcanization; improved and modified reclaim that is more uniformly devulcanized; an accelerator that is safe enough to handle at high speeds and yet that will cure rapidly; compounding pigments without foreign matter and large particles; and a mold lubricant which will not be absorbed by the rubber, will adhere to the mold, and will not accumulate in the mold. As experience with service life tests is built up, it may be possible to ease up on the present specifications in favor of service specifications and thus accomplish a saving in production costs. More consideration should be given to test equipment so that closer

agreement in results may be obtained. Continued cooperation between automotive engineer and rubber technologist was urged.

"Testing of Rubber Automotive Parts." Amos W. Oakleaf, U. S. Rubber Products. There are four types of test for determining adhesion of rubber to metal: shear, rocking, probe, and break tests. Vibration dampers are tested for torsional deflection under load, concentricity, and parallelism. Motor mountings are tested to determine the load necessary to deflect the mounting for a specified distance or vice versa. The compression set test is used to ascertain whether or not the rubber will retain its elastic properties under prolonged action of compressive stresses. Because of its convenience the durometer is probably the most universally used instrument in testing automotive rubber parts. Tests such as: specific gravity, acetone extract, rubber content, and ash should be omitted from specifications, unless there is a definite reason for their inclusion. Thus the rubber compounder will have sufficient leeway to furnish a rubber which will give the best service.

Los Angeles Group

A MEETING of the Los Angeles Group, Rubber Division, A.C.S., was held April 5 at the Hotel Mayfair, Los Angeles, Calif. At this meeting, sponsored by The B. F. Goodrich Co., were 119 members and guests. Amendments to the by-laws were accepted by the members to the effect that the executive committee shall consist of the group officers, the retiring president, and three others elected by the group. Following the dinner and business meeting, W. H. Grote, of the United Carbon Co., Charleston, W. Va., entertained the group in the inimitable Grote manner with feats of magic.

The Goodrich program was opened by the introduction of J. C. Herbert, general manager of the Goodrich company's Los Angeles division, who turned the direction of the program over to W. R. Hucks, also of Goodrich. The first feature was a motion picture, illustrating the development and use of the "De-Icer," a patented Goodrich apparatus to break the formation of ice on the wings.

Mr. Hucks then interviewed Harold Brandt, of the Goodrich Engineering Department, regarding the construction details of the largest airplane tire ever built, which was on display at the meeting. During the course of the interview it was disclosed that this unusual tire weighed 357 pounds and contained over 45 miles of fabric and approximately one mile of wire. The inner tube weighs 45½ pounds, and the tire is rated at 30,000 pounds' carrying capacity. L. L. Horchitz, the next speaker, discussed the applications of rubber in grinding the 200-inch mirror for the new Palomar Mt. telescope.

The concluding feature of the program was the presentation of Goodrich's new sound film, "Weather Permitting," which covered the development of tread design by Goodrich since the beginning of its tire activities.

The door prizes, two beautiful pen sets donated by Goodrich, were won by C. E. Stentz and P. F. Mekeal. The raffle prize, also donated by Goodrich, was one of the new non-skid tires, the development of which was shown in the motion picture, "Weather Permitting," and was won by J. Hoerger.

The meeting on May 3, the last before the summer recess, will be Aviation Night. A representative from the Douglas Aircraft Co. and another from the Goodyear Tire & Rubber Co. will speak on "Rubber in Aviation." To lend atmosphere to the occasion, an airplane hostess will be the guest of the group on that evening. Programs following the summer recess are to be as follows: October, a major tire company night; November, moving pictures with sound and color experts on the program; and December, another prominent tire company night.

Further plans for the annual deep sea fishing trip this summer will be divulged at the May meeting. Twenty members so far are interested.

E. G. Brooks, of the Golf Committee, has announced that the L. A. Industrial League would be holding tournaments every two weeks and that he hoped the group would form a team to compete in the league.

New York Group

"EXTRA"—as of 4-27-38: OCCASION—Spring Outing; PLACE—Karatsonyi's, Glenwood Landing, L. I., on the north shore, 22 miles from New York: DATE—Saturday, June 11; DETAILS—Next Issue.

THE New York Group, Rubber Division, A.C.S., held its spring meeting on April 8 at the Building Trades Employers' Association club rooms at Two Park Ave., New York, N. Y., with 255 enthusiastic members and guests present for the dinner and informative technical program. Chairman C. A. Bartle announced that the executive committee had made partial plans for the annual outing.

The first speaker of the evening was Dr. E. A. Hauser, of the Massachusetts Institute of Technology, who presented a paper on "Structural Ideas on the Vulcanization of Rubber and Like Substances," based on a study conducted by the speaker and J. R. Brown, also of M.I.T., during the past year. Dr. Hauser opened his talk by a general discussion of vulcanization, reviewing the theories that have been presented on this subject. In regard to the reaction between rubber and sulphur, it was pointed out that the sulphur may combine as a sulphide, disulphide, thioozonide, or sulphydryl group, and also that the combination may be either intramolecular or intermolecular.

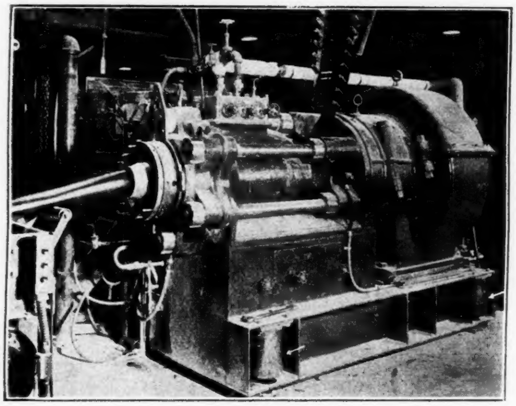
In an attempt to throw some light on the type of sulphur combination, a series of typical low-sulphur, highly accelerated compounds was first studied. The unsaturation was measured by the modified iodine-chloride absorption method, and the combined sulphur was determined as the difference between total sulphur and free sulphur. The results of the measurements along with the physical properties of the four tested stocks which differed only in the accelerator used, indicated that the combined sulphur and the change in unsaturation bear no direct relation to the physical properties of the vulcanized stocks. When the change in unsaturation and the combined sulphur were plotted against each other, it was revealed that, in the case of three of the stocks, the sulphur had evidently combined in excess of the commonly accepted relation of one atom of sulphur saturating one double bond, a relation which seemed to hold for the fourth stock. The results also showed that, after the optimum cure had been reached and most of the sulphur combined, the values for unsaturation decreased rapidly, a fact probably connected with reversion. For comparative purposes two more stocks were tested, one containing rubber and sulphur only, and the other, rubber, sulphur, and zinc oxide. The simple rubber-sulphur compound followed the well-established relation of one sulphur atom saturating one double bond; while in the case of the zinc oxide compound the relation was similar to that observed in the accelerated compounds. The speaker pointed out that undoubtedly some combination of several different reactions could explain the results obtained.

As a possible source of information on the type of reaction that occurred during vulcanization, the method suggested by Meyer and Hohenemser was applied in testing the above series of compounds. In this test, which is based on the fact that alkyl halides add to alkyl sulphides or thio-ethers to form sulphonium compounds, methyl iodide was used in testing for thio-ether linkages in vulcanized rubber. Results showed that thio-ether sulphur accounted for 20 to 60% of the combined sulphur, varying according to the accelerator used, but showing no definite correlation with the physical properties. From the results obtained and owing to the fact that methyl iodide is capable of reacting with other organic sulphides that may be present in vulcanized rubber, it was pointed out that it is doubtful that this test is sufficiently reliable for the study of sulphur linkages.

In conclusion Dr. Hauser said that work has been started in applying other tests in this study. Since the application of chemical tests is handicapped by the necessity of either dispersing the sample in a solvent or finding reactions which can be applied to solid rubber, it was suggested that signficant information may be obtained by the study of Raman or infra-red spectra. These results correlated with purely

(*Continued on page* 78)

New Machines and Appliances



National Extruder with Goodrich Vibro-Insulators

Extruder Equipped with Vibro-Insulators

THE utility of rubber mountings for rubber machinery is exemplified in this new 10-inch heavy-duty extruder. The base is designed with channel rails in which are installed Goodrich Vibro-Insulators so as to absorb shock and vibration as well as reduce noise. This assembly is particularly valuable when used on upper floors of factory buildings. The extruder is also available in 2½-, 3½-, 4½-, 6-, and 8-inch sizes. The unit is self-contained with direct drive and is fully equipped with motor and all electrical accessories.

The accompanying photograph shows a plant installation with The B. F. Goodrich Co. Vibro-Insulators at the locations indicated by the arrows. National Rubber Machinery Co., Akron, O.

Rubber Tool-Holder on Electric Drill

THE "Do-All," combination electric hammer and drill, incorporates in its construction a newly developed tool retainer (patent applied for) which eliminates a disadvantage of previous models. The retainer, made of molded rubber, fits over the nose of the hammer and holds the cutting tool in place with the correct amount of play for rapid drilling or cutting. It also prevents grit from getting into the socket in overhead drilling operations.

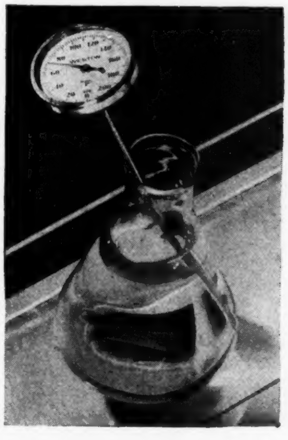
Formerly the tool, used in conjunction with the electric hammer, was fitted loosely in a socket, allowing a free rebound after each blow. This method had a disadvantage as it was easy to drop the tool or shoot it from the hammer with the possibility of doing injury. As the rubber retainer now

"Do-All" Hammer and Drill

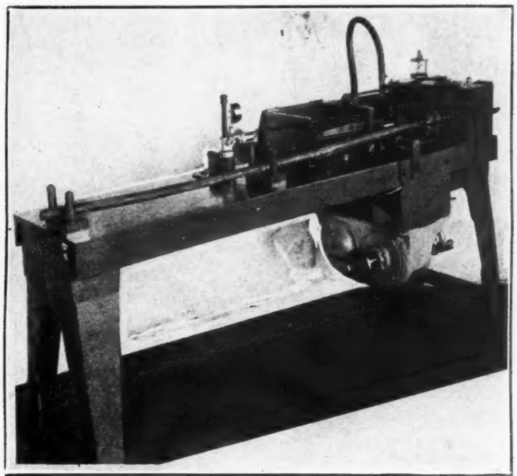
holds the tool in place, this disadvantage is overcome. Wodack Electric Tool Corp.

Ring and Washer Cutting Machine

A RECENTLY developed ring cutter measures and cuts rings from tubed or extruded stock without the aid of a mandrel, a feature which permits it to handle stocks up to 24 feet in length, greatly reducing end waste. The machine is equipped with an accurate mea-



Laboratory Thermometer



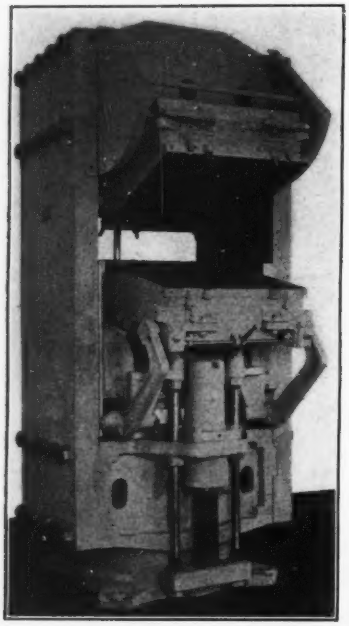
Utility Ring Cutter

suring device which readily adjusts the size of the cut from a thin slice to four-inch lengths. Tubes with wall thicknesses up to ⅝-inch and solid stock up to 1¼-inch in diameter can be readily cut. A variable speed drive built into the power unit provides for adjustment to the best suited speed for a particular type of work. The machine is built in two sizes: No. 1 is for stocks of one inch to 3¾ inches, outside diameter; No. 2 takes tubes of ¼-inch to two inches, outside diameter. Utility Mfg. Co., Cudahy, Wis.

Stainless Steel Thermometer

A NEW-TYPE thermometer, for laboratory use, comprises a dial-and-pointer scale, encased in stainless steel and mounted on an eight-inch stainless steel stem. The pointer is actuated by means of an internally balanced double coil of thermostatic bimetal sealed in the lower 1½ inches of the seamless stem. When the stem is immersed to a depth of 1½ inches in a liquid (three inches in gas or vapor), there is no necessity of stem correction.

Accuracy of the unit is guaranteed to one-half of 1% over the entire scale. This thermometer features easy readability, with the dial markings in plain sight and not subjected to obliteration from the solutions under test. Of rugged construction, it is said to be corrosion-proof to all but a very few laboratory reagents. The unit is made in the following scale ranges: 0-220° F., 50-300° F., 50-500° F., 0-100° C., and 0-150° C. Weston Electrical Instrument Corp.



Automatic Molding Press

Fast Production Press

QUANTITY production of molded rubber and plastic parts may be obtained through the use of a recently developed automatic press of the tilting-head type. Where accumulator equipment is not available, the press can be supplied with a self-contained pump. The solid side tension members and the adjustable gib guides on all four corners of the moving platen assure accurate alinement.

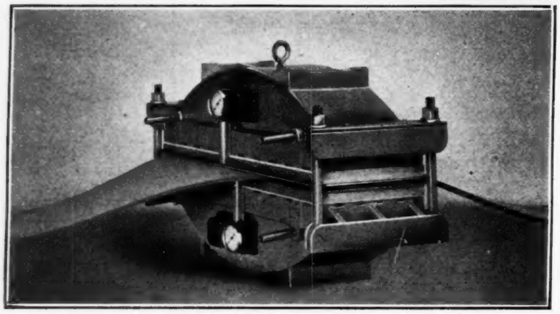
Strippers in the bottom platen provide for automatic multiple ejection of the molded forms. The stripper action is accentuated by the lowering of the ram, which engages the stripper pins immediately at the start of the down stroke. The pins are held in the up position until released by the small hand-lever shown on the front edge of the platen.

The press has a rated capacity of 1,000 tons for molds measuring 38 by 38 inches and an 18-inch stroke with a straight vertical travel of 5 inches. The working pressure is 2,500 pounds, and the diameter of the ram is 32 inches. Lake Erie Engineering Corp.

Portable Belt Vulcanizer

THE No. 28 Heintz diagonal vulcanizer consists of top and bottom sections, each weighing 150 pounds, and is suitable for making angular splices in conveyer or transmission rubber belting up to 28 inches in width. The top removable half is held by quick-acting clamp bolts at each of the four corners so as to provide a platen pressure of approximately 125 pounds per square inch over an area 11 inches wide. Sheet steel cover plates project one inch beyond the platens, providing a cold extension of the platens to prevent marking or injury to the adjacent portions of the belt. Between the lower platen and the sheet steel cover is placed a 3/16-inch thick cushion pad made of a heat resistant rubber compound to absorb irregularities in the thickness of the belt. The normal life of the curing pad is approximately 50 heats, after which it should be replaced.

The press platens are heated by means of electric heating elements of chromium-nickel wire embedded in a refractory cement, which are installed directly to the inner side of the platens. The heating units are so distributed that the maximum variation of temperature between any two locations on the platens is less than 5° F. Each platen is provided with an automatic temperature control which is claimed to function with a temperature fluctuation of less than one degree. These controls may be adjusted to maintain any desired temperature between 240 and 320° F. James C. Heintz & Co.

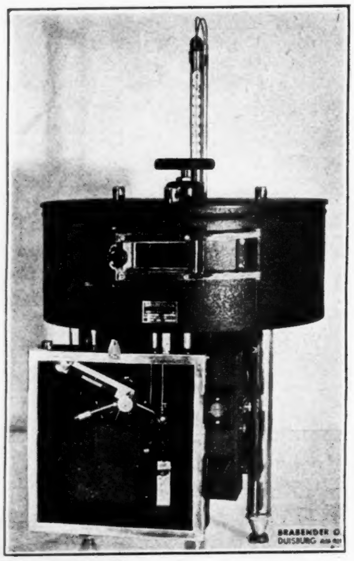


Rubber Belt Vulcanizer

Moisture Tester

A NEW moisture tester, a combination drying chamber and analytical balance, has been designed to facilitate laboratory moisture determinations, particularly where a large number of these time-consuming tests have to be made. Temperature control is effected by means of an adjustable contact thermometer and relay; the obtainable temperature range is between 85° and 175° C. An adjustable opening at the bottom and three vents at the top of the chamber permit controlled circulation for removal of the moisture-laden air. The chamber is well insulated and circular in form. A circular shelf, which can be rotated by means of a hand wheel shown at the top, has provisions for ten sample dishes all tared to exactly the same weight. Samples are weighed in a conventional analytical balance to exactly ten grams before placing in the drying chamber.

Below the drying chamber is the analytical balance. To weigh at the end of the drying period a lever is pushed which releases the balance mechanism. Three needles, shown in the illustration, rise into the drying chamber and lift the dish off the shelf for weighing. From an illuminated scale (right bottom) the moisture content of the sample can be read off directly in percentage. This is made possible by the fact



Moisture Determination Apparatus

that all dishes and samples are of a definite weight. The range of the percentage slide is from 0 to 25%, and it is claimed that readings are accurate to 1/20 of 1%.

Practical advantages of this moisture determination method are the time saving element and elimination of percentage calculation. In addition, highly hygroscopic materials are not subject to absorption of moisture in the weighing process as the samples are weighed directly in the drying chamber. A further advantage of the tester is in the obtaining of drying rates as periodic determinations may be made. A drying curve may be plotted for one sample; the time interval is limited to the actual drying time of the material. Further, drying curves may be made at different temperatures with temperature variation possible through simple adjustment of the contact thermometer. Brabender Corp.

Retarder for Captax-D.P.G. Compounds

A retarder, known as RM, has been introduced on the market to prevent scorching in stocks containing combinations of a Captax-type accelerator and a guanidine accelerator. This retarder, recently developed by the Rare Metal Products Co., Belleville, N. J., is said to control the vulcanization of this type of stock without reducing the ultimate tensile strength. In molding rubber products the delayed vulcanizing action allows time for the compound to fill the mold completely before the curing begins.

New Goods and Specialties

Snow White and the Seven Dwarfs in Rubber

FOLLOWING the wide success of Walt Disney's first full-length picture, "Snow White and the Seven Dwarfs," is the introduction of rubber products which depict in the inimitable Disney manner his lovable screen characters. Two rubber companies are very busy trying to meet the great demand for these items. The Oak Rubber Co. makes balloons (see illustration) in the popular head and body type and also reproduces these characters on toss-up balloons. Seiberling Latex Products Co. creates Disney's clever figures in beautifully decorated molded rubber.

Molded Characters by Seiberling Latex

Oak Rubber Co.'s Balloons

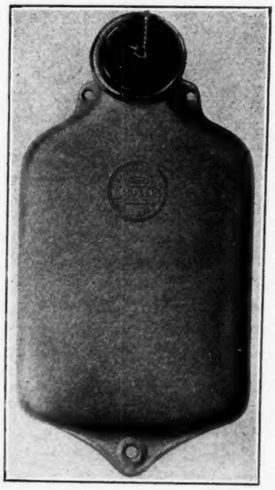
Oil-Proof Fuel Hose

HOSE for fuel oil reel service, through the use of Neoprene for both inner tube and cover, is said to be oil-proof inside and out. Layers of closely-braided cords provide reenforcement for the three sizes of hose available: 1, 1¼, and 1½ inches, inside diameter. Electric Hose & Rubber Co.

Electric-DB Fuel Oil Reel Hose

Dual-Purpose Bottle

KNOWN as No. 100 Duplex, a rubber hot water bottle through the use of an extra-wide opening may also be employed as an ice bag. As two separate needs are served by the purchase of one bottle, the chief advantage is economy. No. 100 Duplex also features a patented, non-losable screw stopper and roughened interior surfaces which tend to prevent adhesion. Davol Rubber Co., Providence, R. I.



Combination Water Bottle and Ice Bag

Rubber Buffer Cleans Tires

A WHITE rubber buffing wheel cleans grease spots, curb scuffs, and yellow stain from white sidewall tires in cases where ordinary cleaners are ineffective. The wheel comprises nine six-inch diameter rubber disks and five 2½-inch diameter rubber spacer disks, all with a ½-inch arbor hole in the center. The buffer, which should not be run faster than 1,750 r.p.m., is used on a flexible buffing shaft and should be kept moving over the sidewall surface constantly to avoid burning or cutting holes. The Goodyear Tire & Rubber Co., Inc.

Rubber Buffing Wheel

Decalcomania Transfers for Rubber

ELASTI-CAL transfer, a special patented process, is a new development in decalcomania transfers offered by the Meyercord Co., 5323 W. Lake St., Chicago, Ill., which will enable rubber manufacturers to use the full range of lithographic colors on their products. The basic process is not new, having been used in other lines such as glass and porcelain for many years. Decalcomania in rubber colors, when applied, is in effect one actual film of rubber upon another and permits mold vulcanization, or cold application with cement. The color range is said to be practically unlimited, and any subject which can be created by an artist can be reproduced by the new process. Elasti-Cal is said to enable manufacturers to utilize new ideas and products in the field of popular rubber merchandise.

Hot Water Bottle Decorated by Elasti-Cal Process

Rubber Industry in America

FINANCIAL

Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.

American Zinc, Lead & Smelting Co., St. Louis, Mo., and subsidiaries. For 1937: net profit after depletion, $207,604 inventory write-down and $25,079 surtax, $184,930, equal to $2.78 each on 66,465 shares of $5 prior preferred stock. This compares with $52,336, or 75¢ each on 69,355 shares of preferred in 1936. December quarter: net loss after inventory adjustment, $108,322, compared with net profit in the preceding quarter of $119,647, equal after quarterly dividend requirements on 66,253 shares of $5 convertible preferred and 2,212 shares of old $6 preferred stock to 5¢ each on 662,686 shares of common stock. In final quarter of 1936 net profit was $93,420, or $1.34 each on 69,355 preferred shares. Current assets as of December 31, 1937, including $252,789 cash, amounted to $3,610,554, and current liabilities, including $1,100,000 notes payable, were $1,886,368, contrasted with cash of $464,838, current assets of $3,665,279, and current liabilities of $848,889 at the end of 1936. Inventories were $2,353,692, against $2,042,983.

American Wringer Co., Woonsocket, R. I., and subsidiaries. For 1937: net loss, $7,222, against net income in 1936 of $160,667, equal to $1.44 each on 111,244 capital shares.

Baldwin Rubber Co., Pontiac, Mich. For 1937: net income, $73,957, equal to 23¢ each on 316,757 capital shares, compared with net income in 1936, after $52,310 surtax, of $483,520, equal to $1.74 each on 278,604 capital shares then outstanding.

Barber Co., Inc., Philadelphia, Pa. For 1937: consolidated net profit, $743,896, equal to $1.90 each on 390,223 shares outstanding, excluding company-owned shares. This compared with $444,545, or $1.14 a share, in 1936. Cash on December 31, last, $3,178,113; current assets, $6,697,618; current liabilities, $653,896. At the annual meeting on April 27 stockholders voted to change the name of the company to Barber Asphalt Corp.

Corduroy Rubber Co., Grand Rapids, Mich. For 1937: net income after $5,500 surtax, $118,821, equal after dividend requirements on prior preferred and participating preferred stocks to 81¢ each on 29,395 common shares. Net income in 1936 was $90,695, or 23¢ each on 29,878 common shares then outstanding.

Collyer Insulated Wire Co., Pawtucket, R. I., and subsidiaries. For 1937: net income, $208,547, equal to $1.39 each on 150,000 capital shares, against $178,752, or $1.19 each on 139,000 shares a year earlier.

Dominion Rubber Co., Ltd., Montreal, P. Q., Canada, and subsidiaries. For 1937: net loss, $222,205, against loss of $93,056 in 1936.

L. H. Gilmer Co., Philadelphia, Pa. For 1937: net income after $28,300 surtax, $112,269, equal to $1.36 each on 82,774 preferred shares.

I. B. Kleinert Rubber Co., 485 Fifth Ave., New York, N. Y. For 1937: net income after depreciation and provision for federal taxes, $119,298, against $168,142 for 1936. Total assets on December 31 were $3,117,097, against $3,230,527 a year before.

Monsanto Chemical Co., St. Louis, Mo., and subsidiaries. First quarter, 1938: net profits, $669,310. After deductions for preferred dividend requirements and minority interests, earnings applicable to common stock were $583,281, or 52¢ a share on the 1,114,388 shares outstanding March 31, 1938. After allowances for minority interests the comparable period of 1937 net earnings applicable to common stock were $1,333,854, or $1.20 per share on the 1,114,408 shares outstanding March 31, 1937.

Okonite Co., Passaic, N. J. For 1937: net income, $538,527, equal, after preferred dividends, to $39.96 a share on 12,000 common shares, against $456,653, or $32.69 a share, in 1936.

O'Sullivan Rubber Co., Inc., Winchester, Va. For 1937: net income, $60,594, equal, after preferred dividend requirements, to 31¢ each on 100,000 unsubordinated common shares, against $52,137, or 22¢ a share on unsubordinated common stock in 1936.

United States Rubber Co., 1790 Broadway, New York, N. Y. For 1937: net sales, $186,253,188, an increase of $25,892,162, or 16% over 1936. Net profit after all current charges except inventory adjustments and income taxes was $11,765,127, against $13,280,021 for 1936. Net income for 1937 was $8,607,903. a decrease of $1,564,582. Market prices of certain materials were below cost at the close of the year, and inventories were adjusted accordingly. This adjustment amounted to $3,647,768, for which provision of $2,000,000 had been made in previous years and an additional $1,000,000 was set aside in June, 1937. The reduction in deficit for the year was $6,860,945, leaving a consolidated deficit of $10,471,627. The cost of taxes for 1937 was $12,327,000, equivalent to the annual dividend requirement on the preferred stock of $8 and $4.63 a share on the common stock. Included in the cost of taxes was approximately $6,480,000 for excise tax on tires and tubes and $1,483,000 for social security taxes. In addition to the payment by the company, it was necessary to deduct $528,000 from the salaries and wages of employes for social security taxes. Total salaries and wages paid during the year amounted to $52,298,000. The average number of employes was 37,109. Total wages paid were 25.9% more and total salaries 11% more than in 1936. Provision of $600,000 has been made for distribution of common stock under the Managers' Shares and B Bonus Plans of the company with respect to earnings for the year. The board of directors authorized a further contribution of $75,000 in cash to the service fund of the Retirement and Savings Fund, paid to the trustees of the fund in January, 1938.

Consolidated balance sheet: Total current assets were $90,309,834, and total current and accrued liabilities $26,768,381 on December 31, 1937. Net current assets were $63,541,453, an increase of $6,588,126 for the year. The ratio of current assets to current liabilities was 3.4 to 1. Outstanding funded indebtedness was $50,800,000, a reduction of $2,433,700 for the year. On October 1, 1937, the 6% Gold Bonds of Dominion Rubber Co., Ltd., due October 1, 1946, were called for retirement and paid. Interest on funded indebtedness was reduced from $2,848,577 in 1936 to $2,574,353 in 1937.

United States Rubber Plantations, Inc., and subsidiary companies had a profit of $6,439,022 before provision for depreciation and amortization of $1,849,373, which resulted in a net profit for the year of $4,589,649. Net profit for 1936 was $1,913,790. A dividend of $100,000 was declared by one of the companies in 1937 to avoid tax penalties, leaving a net credit to surplus of $4,489,649.

(*Continued on page* 78)

EASTERN AND SOUTHERN

INDUSTRIAL activity has experienced little significant change, after allowance for usual seasonal adjustments. A recent government report mentions that several developments indicate the current business recession showed several definite signs of slackening in the first quarter of 1938. The rapid drop in industrial production witnessed last year-end seems checked, and March production was at about the February level, although a slight seasonal upturn is customary. Total production during the first quarter of 1938 was about one-third below that of the similar period last year. Also, in February payrolls and employment increased slightly, the first time since the decline began last August. Another hopeful indication was seen in the dollar value of construction contracts awarded, which advanced recently more than seasonally.

The feeling that business conditions seem to have stopped getting worse appears in a report by a group of business men, who believe that more people opine that the business structure is probably now at the bottom and that after a period of marking time, any change would be for the better—but this, naturally, could not reasonably be expected before the fall this year. The survey further reveals that inventories being slowly worked down are prolonging the time when marked acceleration in buying volume will occur for current operating schedules. Employment figures here present a gloomy picture, with the statement that in some localities the number of workers is below that of 1932, the previous low.

An eminent economist, moreover, flatly states that this is no "mere temporary recession" we are experiencing and that it now seems probable that 1938 will be the most severe depression year in our history except 1932. The second phase of this renewed depression period, the first lasted six months beginning August, gives little ground for expecting a prompt recovery. It has become apparent that normal spring demand for new automobiles is not developing and that little new construction is under way financed by private funds. Unemployment, too, was greatly increased the first quarter of this year. Besides railroad freight loadings declined until those of many roads are about as low as they were in the Spring of 1932. Then, the physical volume of industrial production appears to have dropped to more than 40% below the computed normal level in March.

Hercules Powder Co., Wilmington, Del., at a recent directors' organization meeting reelected R. H. Dunham president of the company and chairman of the executive committee, and C. A. Higgins was renamed chairman of the finance committee.

Binney & Smith Named Utility Mfg. Export Agent

Announcement is made of the appointment of Binney & Smith Co., 41 E. 42nd St., New York, N. Y., as export representative for the Utility Mfg. Co., Cudahy, Wis., in all countries except the United States and Canada. The Utility Mfg. Co.'s line of equipment is well known to rubber manufacturers throughout the world. It includes cutting machines for tire treads, tube stocks, and flat goods; slicers and washer cutters; bead covering and flipping machines; V-belt covering machines; and other specialized equipment.

Binney & Smith Co., long known as a supplier to the rubber industry, particularly in the field of carbon blacks, maintains a world-wide selling and service organization. The addition of the "Utility" line is a further step in its policy of associating itself with leading manufacturers in the field of materials and equipment for the rubber industry.

Rubber Tires Benefit the Farm

For a number of years the use of rubber tires on farm equipment has been forging ahead, but during the past few years this trend toward replacement of metal wheels has assumed highly accelerated proportions. According to the Utica (N. Y.) *Observer Dispatch*, H. E. Babcock, of Ithaca, who operates farms several miles apart, believes that because rubber tires increase the mobility of farm equipment and decrease operating costs on a large scale there will be a great tendency toward larger-scale operation of disconnected farms.

Because of a shortage of houses in cities he predicts that even more people will buy farms primarily to obtain the houses and then will desire to lease the tillable land to farmers. This will enable the owners of small farms to work larger areas and thus take advantage of modern equipment.

Mr. Babcock believes that practically all farm machinery will be rubber tired and that interchangeable running gear will be available for use on several pieces of equipment.

Robinson Wagner Co., Inc., lately of 24 State St., New York, N. Y., has announced that owing to the steadily increasing demand for the various new specialties developed recently, particularly non-flooding pigments and lanoline derivatives, the firm has found it advisable to locate its general offices adjacent to its plant, at 129—51st St., Brooklyn, N. Y. Manufacturing facilities have been enlarged with a railroad siding to handle shipments more efficiently.

Louis Minton, agent for raw and reclaimed rubber, colored pigments, substitutes, and drugs and chemicals, Trevelyan Bldgs., 52 Corporation St., Manchester 4, England, will arrive in the United States about May 2. While his visit is one for pleasure, Mr. Minton intends to contact some suppliers of materials used in rubber goods with a view to the possibility of arranging for their sale or manufacture in England. Mr. Minton has been connected with the rubber industry for more than 40 years, first in the manufacturing end. In 1898, however, he established his own firm, handling every type of commodity including raw rubber and compounding ingredients. Many of the latter are prepared from Mr. Minton's formulas and under his own supervision, and others in the capacity of agent for American, British, and other manufacturers. Mr. Minton also assisted at the inception of the "Institution of the Rubber Industry."

Eastern Color & Chemical Co., dealer in chemicals, colors, and minerals, last month moved from 235 Fourth Ave. to 145 Nassau St., New York, N. Y.

The Flintkote Co., 50 W. 50th St., New York, N. Y., has announced that at a recent meeting of its board of directors in Boston, Mass., George K. McKenzie, 26-year-old head of the Flintkote legal department and assistant secretary of the concern since 1936, was elected secretary of the company and of its subsidiaries.

The Federal Trade Commission, Washington, D. C., has issued an announcement of a modification of a former order in the case of the Climax Rubber Co., 276 Ten Eyck St., Brooklyn, N. Y., by which the company is permitted to represent that its products "have antiseptic properties and combat the growth of bacteria." The company may not represent that its products kill all germs and bacteria, which is not contended by the company. The modified order also permits the company to represent that its products "combat obnoxious odors developing from the fermentation or putrification of body wastes." The case in which a cease and desist order was originally issued has become fairly well known, since it has been pending for almost three years. Under the modification by the Federal Trade Commission, the company, of which Jacob Stein is president, may now proceed to advertise its products in accordance with the terms of the modified order, and it is expected soon to do so. The products of the company include infants' garments and rubber sanitary and waterproof products, which are said to have had wide acceptance, including Healthgard baby pants, crib sheets, and sanitary wear.

U. S. Rubber Events

Recapitalizing Plan

Stockholders of the United States Rubber Co., 1790 Broadway, New York, N. Y., held a special meeting in Jersey City, N. J., at which they voted in favor of (84.4% of preferred shares and 82.3% of common, compared with the requirement of only 75% of each class) the four following proposals.

1. The creation and issuance of bonds to be secured by a mortgage upon the property of the company and to be issued to refund outstanding bonds and for other corporate purposes. Stockholders decided upon the redemption, July 1, 1938, of all ($50,000,000) of the First and Refunding 5% Gold Bonds, Series A, due January 1, 1947. Issued will be $45,000,000 of bonds, dated July 1, 1938, for 20 years, with interest at 4¼%. These bonds have been sold privately to large institutional investors.

2. The extension of the corporate existence of the company for 50 years from March 30, 1942.

3. The retirement of the preferred and common stocks held in the name of a subsidiary company and reduction of the capital accordingly. For many years the company has held in the name of Meyer Rubber Co., a wholly owned subsidiary, 38,909 shares of first preferred stock, $100 par value, and 81,588 shares of common stock, no par value, of U. S. Rubber.

4. The change of the common stock, now without par value, to a par value of $10 a share and reduction of the capital accordingly. The shares of such common remaining after the aforementioned retirement and consisting of 351,151 shares authorized, but unissued, and 1,567,261 shares issued and outstanding are to be changed, share for share, into shares of common stock having a par value of $10 each; accordingly the capital of the company will be reduced to $80,781,710, represented as to $65,109,100 by 651,091 shares of first preferred and as to $15,672,610 by 1,567,261 shares of common. From the capital surplus of $85,222,791 thus created the company will write off $57,662,405 of good will, patents, etc., create a further reserve of about $11,000,000 against idle plants, write off the premium of $2,500,000 payable upon the redemption of the 5% bonds, and eliminate the outstanding deficit on the books which amounted to $13,040,901 on December 31, 1937. After providing for these items a capital surplus of about $1,000,000 will remain, and there will be net earned surpluses of subsidiary companies of $2,569,274 exclusive of surpluses on the books of the plantation companies.

Annual Meeting

U. S. Rubber Co.'s stockholders held their annual meeting on April 19, at which Wm. de Krafft, chairman of the finance committee, reported the company about broke even during the first quarter of 1938, with business volume running at an annual rate of about $120,000,000. A considerable increase is expected during the rest of the year, but Mr. de Krafft stated there would be no consideration of dividend action before July 1.

Approved by the stockholders was a new six-year salary and pension contract for President F. B. Davis, Jr.

Samuel L. Howard, S. C. Wood, and Wm. M. Stevens were named temporary directors to bring the board's members to the required number of 15.

Personnel Activities

Mr. Davis last month was elected a director of the Equitable Life Assurance Society of the United States.

Harold B. Spencer, manager of industrial and public relations, Mishawaka, Ind., on April 1 addressed the South Bend-Mishawaka Real Estate Board and showed the motion picture, "The Romance of Rubber," devoted to U. S. Rubber's plantations.

The company's plant at Passaic, N. J., recently opened a parking lot conveniently located for the benefit of its employes and at considerable expense to the company, according to Thomas F. Russell, manager of industrial relations. Traffic congestion has been relieved by this plan, and workers can now park their cars where they will not be subjected to vandalism and pilferage, as formerly.

Export Shipping Discussed

Among representatives of large shippers at a public hearing held in New York on April 18 by the Maritime Commission under the auspices of the Port of New York Authority, Geo. F. Hitchborn, general traffic manager for U. S. Rubber, represented the Shippers Conference of Greater New York.

Mr. Hitchborn emphasized the importance of the time in transit and stated that there is a definite advantage in the concentration of shipping services in the port of New York because greater frequency of service results. While approximately 50% of all export freight goes in foreign bottoms at the direction of the consignees, he said he believed that American industries desire to favor American flag vessels when the frequency of sailings and other factors are equal, but that shippers often gave preference to ships sailing direct rather than to those making other ports before final departure.

Removal Notice

United States Rubber Products, Inc., recently moved from 336 Central Ave. to 1168-70 Broad St., Newark, N. J.

American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y., has appointed Hugh Puckett, formerly assistant southern sales manager, as southern sales manager with headquarters in Charlotte, N. C. His previous business affiliations were with National Aniline & Chemical Co., General Dyestuff Corp., and Charles H. Stone, Inc.

Du Pont Activities

Coming Exhibits

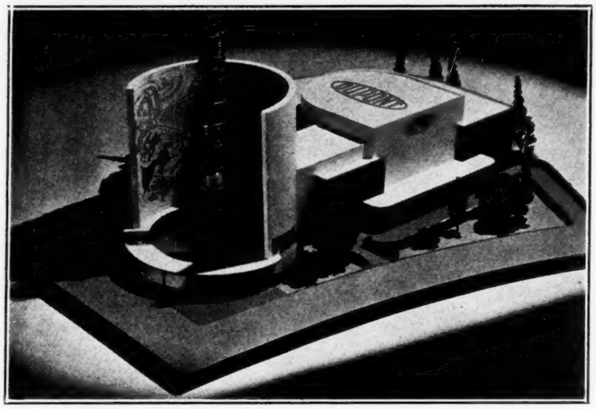
E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has scheduled several interesting displays at various exhibitions to be held in the United States. Du Pont will stage an exhibit depicting the contributions of the chemical manufacturing industry to the petroleum industry at the International Petroleum Exposition at Tulsa, Okla., May 14 to 21. Neoprene chloroprene rubber will be represented in two sections, one pertaining to its use in oil production and the other in its application to marketing. The producing exhibit will use two miniature oil derricks against a painted backdrop, one derrick being in motion to show oil pressure drilling with a Neoprene rotary hose. Equipment in which the material is used, such as pistons, packers, oil-savers, valve seats, and other products, will be shown. The Neoprene marketing section will use tri-plane revolving pictures, showing the place of Neoprene hose in loading tankers, in the service station, and in delivering fuel oil to the home.

The forthcoming Coal Exposition at Cincinnati, O., will house a du Pont display designed to demonstrate the significance of modern chemistry to the coal mining industry. One section will show products made by the chemist from coal, such as plastics, dyes, perfumes, etc. The three products booths will be given over to exhibits of "Ventube" mine ventilating ducts, wood preserving treatment for mining timbers, and the application of Neoprene in the coal mining field. At the Neoprene display, a large panel, diagraming the process of manufacture, emphasizing the origin of the material from coal, forms the background. Smaller transparencies will indicate the various uses of Neoprene in coal mining. Another feature of the exhibit will be showings of the company's moving picture, "The Wonder World of Chemistry." Representing du Pont's Neoprene division at the exposition will be H. F. Lawrence and R. H. Smith.

Du Pont also plans a fascinating exhibit (see illustration), "The Wonder World of Chemistry," at the New York World's Fair in 1939. It will dramatize the contributions of chemistry to every phase of social and industrial life. Besides the firm's film will have many showings. A glorified laboratory in action, a symbolic mural painting, and colorful liquids in illumination are listed as other attractions. One of the processes mentioned for demonstration in the laboratory is the creation of synthetic rubber.

Annual Meeting

At the recent annual stockholders' meeting President Lammot du Pont forecast an expenditure of $38,000,000 by the company for 1938, all for additions to present plants or for new units except for $1,800,000 for maintenance and repairs. The 1937 figure was



"The Wonder World of Chemistry," the Exhibit Scheduled by E. I. du Pont de Nemours & Co., Inc., for the New York World's Fair Next Year

$50,000,000. Sales for January and February ran about the same, but showed a slight improvement over the December rceord. Vice President A. B. Echols stated sales for the first half of 1938 are estimated to fall 25% below the volume for the corresponding period last year.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., reported at its annual stockholders' meeting on April 13 that although bookings during the first quarter of 1938 were 49% less than during the first quarter of 1937, March business showed an increase of nearly $4,000,000 over February. Incoming orders for the first three months of 1938 totaled $37,998,569, against $74,-242,584 during the same period of 1937. March, 1938, bookings were $15,126,588; February bookings were $11,439,127. On March 31, 1938, unfilled orders amounted to $53,651,814, compared with $60,298,087 on January 1.

Five directors were elected at the meeting. Succeeding themselves were Jerome J. Hanauer, W. L. Mellon, Frank A. Merrick, and George M. Verity; the new member elected was C. W. Pomeroy, secretary of the company.

A. W. Robertson, chairman of the board, in a brief talk to stockholders pointed out that the company is making profits despite general adverse business conditions.

"I believe that unless things get much worse than we are accustomed to expect in America," he said, "we will come through without too much difficulty. There are substantial orders on the books. This month we will pay back $5,000,000 of the money we borrowed last year to help us meet the enormous rush of business, and very soon we expect to pay off the balance, which will leave the company out of debt—the way we like to be. Orders were good in March, and so far in April the improvement continues."

William R. Cisney, assistant general sales manager of the A. Schrader's Son Division of Scovill Mfg. Co., 470 Vanderbilt Ave., Brooklyn, N. Y., and Miss Dorothy Conwell Hood, of Fort Worth and Dallas, Tex., were married on March 25 in New York. Miss Hood, who is also an accomplished aviatrix and musician, is well known throughout the United States for her educational lecture work with National Broadcasting Co. Since receiving his degree in 1922 at Swarthmore College, where he was active in campus activities and a member of Phi Sigma Kappa and Book & Key fraternities, Mr. Cisney has served the pioneer tire valve manufacturer, first in a secretarial and then a sales capacity. The couple will reside in the vicinity of New York.

International Management Congress, September 19, 1938

A three-cornered debate on the labor problem — among an internationally known labor-union spokesman, a large employer of labor, and a representative of the consuming public—is expected to be one of the features of the public sessions of the Seventh International Management Congress, which convenes in Washington, September 19.

This will be only one of the provocative features of what it is the declared hope of the Congress committee to make the most outspoken international business conference ever held. There are to be two addresses on "The Continuance of Free Enterprise;" one, it is expected, to be delivered by an executive of a large manufacturing company known to be openly critical of present government policies; the other by a speaker from Czechoslovakia, where free enterprise is making its stand against Fascism on one side and Communism on the other.

At the same time speakers from Germany and Italy are expected to make what may prove the frankest and most complete statements of the case for "totalitarian" state control yet offered to an American audience.

There are to be six series of "Technical Sessions," devoted respectively to Administration, Personnel, Production, Distribution, Agriculture, and the Home. The Production sessions will have open discussions based upon papers on such topics as "Organization for the Control of Manufacture;" "Modern Quality Control Technique;" "Accounting for the Control of Manufacture;" and others of like nature. In the Personnel sessions will be papers on accident prevention; developments in personnel management in Great Britain; "Profit Sharing as an Incentive;" "Dismissal Wages or Termination Allowances;" and similar topics presented by authorities in their respective fields.

Vansul, Inc., formerly of 110 Broad St., New York, N. Y., has announced the recent removal of its New York offices to its Englewood, N. J., plant at 193 William St., to which all communications should be addressed. The removal of the offices to the factory will greatly facilitate service to customers by centralizing the company's activities under one roof and making it unnecessary to transfer orders from New York to Englewood. J. de C. Van Etten, president of the company, will make his headquarters in Englewood.

National Association of Purchasing Agents, 11 Park Place, New York, N. Y., will hold its twenty-third annual international convention and Inform-a-Show at the Jefferson Hotel, St. Louis, Mo., May 23 to 26. Outstanding industrial and public leaders will participate in the program, to cover intensive business discussions, including Raymond Moley, Warren Bishop, Howard Coonley, C. M. Updegraff, Dr. Harrison E. Howe, and Dr. A. A. Bates. Dr. Howe, editor of *Industrial and Engineering Chemistry,* will discuss "Recent Chemical Developments and Their Effect on Business;" and Dr. Bates, who is on the research engineering staff of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will talk on "Effect of Recent Developments in Mechanical and Metallurgical Research." Among companies having exhibits at the Inform-a-Show are: Eagle Pencil Co., 703 E. 13th St., New York; Eberhard Faber Pencil Co., Brooklyn, N. Y.; Garlock Packing Co., Palmyra, N. Y.; Jenkins Bros., Bridgeport, Conn.; Scovill Mfg. Co., Waterbury, Conn.; and United States Gutta Percha Paint Co., Providence, R. I.

General Electric Co., Schenectady, N. Y., at a meeting of the directorate in New York on March 25 elected Charles E. Wilson, executive vice president, and Philip D. Reed, assistant to the president, as directors to fill existing vacancies on the board.

Orders received by General Electric in the first quarter of 1938 amounted to $65,376,400, against $105,747,030 for the same period last year, a 38% decrease, according to President Gerard Swope recently.

General Electric employes during 1937 received nearly $85,000 for new ideas submitted through the company's suggestion system. During the year almost 37,000 suggestions were made by workers, and more than 12,000 were adopted. During the past 11 years nearly $600,000 has been paid out to employes for new ideas adopted for use.

OHIO

BUSINESS reports in Ohio vary. Some manufacturers of rubber machinery continued strong, with business, however, based largely on contracts placed early in '37. Some smaller rubber companies, not primarily influenced by industrial conditions, are enjoying a good amount of business on full-time operations. Tire makers expect a good year for replacement sales, but not much from original equipment orders. Last month steel-ingot production, after gaining for four weeks, dropped again.

General Tire News

Officials of General Tire & Rubber Co., Akron, including Wm. O'Neil, president, Charles J. Jahant and W. E. Fouse, vice presidents, L. A. McQueen, sales manager, Ray W. Brown, aeronautical sales manager, and Robert Iredell, chief engineer, were among those on hand to greet Major General Oscar Westover, chief of the United States Army Air Corps, when he came to Akron in celebration of Army Day, April 6. During his stay in the Rubber City the general was a guest of Mr. Brown, a long-time personal friend.

The Passing of the Ford Clincher Tire

More than ten years ago Henry Ford stopped building cars that used the old-fashioned 30- by 3½-inch clincher tires. But Fords using the old clincher tires did not go out of existence. In fact some are still running.

Eighteen years ago when the 30- by 3½-inch cord clincher tire was an innovation, General Tire started building them for Fords. Not until a few days ago, however, did General discontinue building this old tire.

At one time the leading tire in the light automotive field, its use decreased year by year as the old Fords gradually went out of commission. Finally, the comparatively few Fords of the early Twenties that were still running were no longer being equipped with tires of General's quality; so the last General 30- by 3½-inch cord clincher tire came off the production line.

It was finished by Wilda Rexroad White, who had also finished the first tire of this type that General built 18 years ago. Irvin Miller, who helped build the first such clincher tire in 1920, is still employed in the General factory, but had not been building clincher tires for some time. Homer Dobbins, who cured the first 30- by 3½-inch clincher tire, is still employed in General's curing room.

Vice President Jahant, who ordered the first tires of this type in production, watched the last of the clincher tires come off the production line.

General Tire's Vice President C. J. Jahant, Looking at the Last Clincher Tire Made by the Company; Irvin Miller and Wilda White Are Holding the Casing

Goodrich Notes

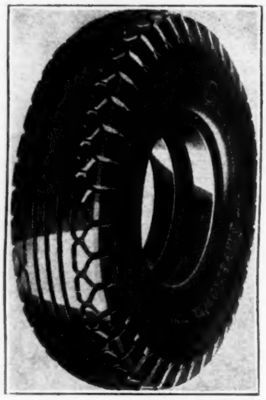
Sales Increase for Farm Tires

Estimating that sales of rubber tires for tractors and farm implements increased to approximately $19,000,000 last year from less than $1,000,000 in 1933, S. B. Robertson, president of The B. F. Goodrich Co., Akron, O., recently predicted that more than 75% of all farm vehicles will be rubber equipped ten years hence. This rapid expansion of the market for tires in the agricultural machinery field is one of the most important developments in the rubber industry, Mr. Robertson said. He declared that at the present rate of growth rubber tire sales for tractors and implements might easily reach $75,000,000 to $100,000,000 a year by 1948. Such a figure, he stated, would be equal to about 10% of the rubber industry's present annual sales volume on all products including tires.

Production schedules for tractor manufacturers in 1938 call for equipping 60 to 85% of the vehicles turned out with rubber tires, and in some areas tractors are being shipped out 90% rubber equipped.

Although there is already a firmly established trend toward greater mechanization of U. S. farms, as indicated by the 12% increase in tractor registrations since 1933 to the April 1, 1937, total of 1,382,872, Mr. Robertson said that introduction of a small tractor, to sell for less than $500, should hasten the process.

There is still plenty of room for expansion in this field, he believes, since according to recent estimates only 23% of the farms in the country now use mechanical equipment.



Silvertown Truck and Bus Tire

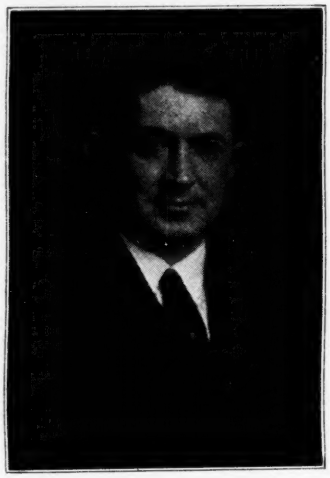
New First-Line Truck, Bus Tire

Goodrich recently announced a new Silvertown truck and bus tire, its first-line product for commercial service. It is built with the recently announced Hi-Flex cotton tire cord, designed primarily to reduce tire heat generated in high-speed service. So-called artificial stretch is removed before the cord is built into the tire, resulting in a more compact, smaller-gage product, which returns to its original position after being stretched. The old-style cord frequently lost its elasticity very early in hard service. In building the tire by the new method the manufacturer is able to use more rubber between cords. Slippage of fibers against each other is prevented, reducing friction and internal heat. High working stresses are said to be more easily withstood, and shoulder and sidewall breaks from excessive flexing materially reduced.

New Brake for Planes

A new airplane brake developed by Goodrich has been introduced for general aeronautic uses. It will be manufactured in several sizes from a five-inch unit for light airplanes to the 25-inch brake which will equip the new 42 passenger super-transport airliners now in construction. The Goodrich brake is said to give uniform pressure against the brake drum at all times and under all conditions of operation, is non-energizing, and adjusts itself automatically to offset lining wear.

Goodrich manufactures more than 50 rubber products for aeronautic uses.



J. Frank Cooper

Goodyear Activities

Balloon Builder Honored

The Paul W. and Florence B. Litchfield Medal for Exceptional Merit and Services Beyond the Line of Duty was presented to J. Frank Cooper, general foreman of the Balloon Department of The Goodyear Tire & Rubber Co., Akron, on April 6, in recognition of his work in building the stratosphere balloon, *Explorer II*, the largest balloon ever built, one hundred times larger than conventional racing balloons, which on November 11, 1935, carried two Army officers, Capt. (now Major) A. W. Stevens and Capt. A. O. Anderson, pilot, to a height of 72,395 feet into the air, higher than man had ever gone before. In building this balloon Cooper used more than 13,000 yards of rubberized fabric. Each small piece had to be exactly patterned and then cemented and taped together so that when the gas was put into the vast piece of aerial "haberdashery," it would form a perfect sphere and be strong enough to carry 15,000 tons of weight.

Mr. Cooper had unusual qualifications for the job. He built more than a thousand kite and training balloons for the Army and Navy during the World War, built the cigar-shaped balloon sections for a hundred blimps, the huge gas cells for the *Shenandoah*, the replacement cells for the *Los Angeles*, and the even larger gas cells for the *Akron* and the *Macon*. Indeed, a more intricate job for Cooper in recent years has been the construction of the grotesque figures for the Macy Thanksgiving parades. Cooper designs the figures himself, using Tony Sarg drawings instead of blue prints. While Cooper is perhaps one of the greatest balloon constructors in the world, he also has an unusual record as a balloon pilot.

He was born in Parkersburg, W. Va., 53 years ago, joined Goodyear in 1913 as a member of the Flying Squadron, and has had charge of the balloon room during almost the entire period of Goodyear's work in lighter-than-air. His 25-year service pin was awarded to him at the same time as the Litchfield Medal.

The celebration on April 6 was attended by Goodyear officials, Army officers, and National Geographic Society agents, also Tony Sarg and figures prominent in the flying world. Major Stevens showed motion pictures of the flight of *Explorer II*. Also shown was a film, "Cooper's Balloon Babies," revealing highlights of the balloon builder's career.

Safety Award

Plant 2 Tire Division won the annual Goodyear safety contest for 1937. Presentation of the bronze trophy was made to J. P. McIntire, superintendent of the winning division, by Vice President C. C. Slusser. The Plant 2 division had an excellent record last year with only 6½ accidents per million man-hours worked.

The divisional safety contest has been won three times by Plant 2 Tires in the past six years—in 1932, 1936, and 1937. The plaque was won by Reclaim Division in 1933 and 1934 and by the Chemical Division in 1935.

1,200-Pound Truck Tire

Construction of one of the industry's largest heavy-duty truck tires, (size 24.00-32, weight 1,200 pounds), was recently completed by Goodyear and is the first of a series to be built for a manufacturer of earth-moving vehicles. The 30-ply tire, which, when inflated at 75 pounds' air pressure, will have a load capacity of 25,000 pounds, has an outside diameter of 82 inches, is nearly a foot taller than an average man, measures 25 inches in cross-section, and has a rim diameter of 32 inches. It weighs more than double the largest truck tire previously built, an 18.00-24 tire weighing 500 pounds; also as compared with the 120 by 33.50-66 tires Goodyear built last year for a big marsh buggy, the new 24.00-32 outclasses these in weight by 885 pounds per tire and in inflation pressure as well. The new pneumatic fits on a rim 17 inches wide, upon which is a flange 3½ inches high. Tread is the standard Goodyear Sure Grip design used on tractor tires. The tire uses a protective flap weighing 17 pounds.

To vulcanize the giant rubber casing required construction of a special mold weighing 13½ tons; while for the tube alone a mold weighing 10,500 pounds was needed.

Among the Personnel

Goodyear recently sent two men, experienced in belt manufacture, to its Argentina plant, Larry R. Erwin, of development design, Plant 2, will have charge of development for the manufacture of belting. Joe Ripple, ex-Squadron man, will have charge of belt manufacture.

Marathon Tire

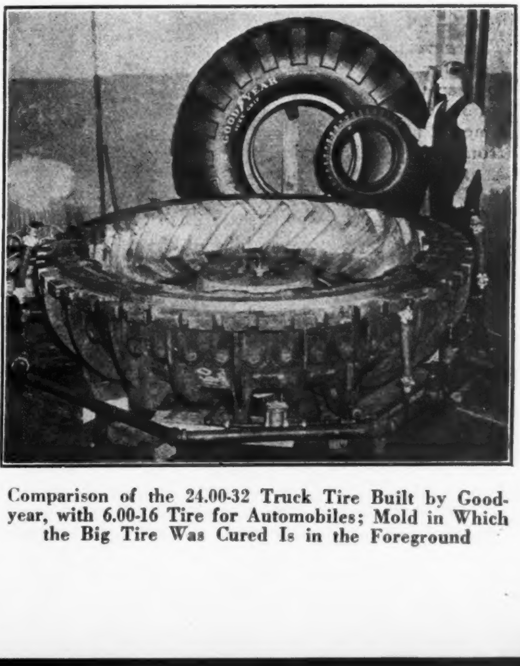
Goodyear recently announced a new popular price tire, the Marathon, made in nine sizes: 4.50-21, 4.75-19, 5.00-19, 5.25-17, 5.25-18, 5.50-17, 6.00-16, 6.25-16, 6.50-16. The new tire comes in four-ply construction only.

LifeGuard Campaign

A series of six divisional conferences covering the country informed the Goodyear field organization of the new and intensive effort that the company is making to stimulate sales of Goodyear LifeGuards, the new safety reserve tire said to eliminate danger from blowouts and other high-speed tire failures. Several hundred sales representatives attended each of the two-day meetings held in Los Angeles, St. Louis, Chicago, New York, Washington, and Akron. Each meeting was addressed by President Litchfield, R. S. Wilson, vice president in charge of sales, H. E. Blythe, tire sales manager, and J. K. Hough, director of advertising. Other factory officials, as well as divisional and regional men, also spoke.

As a result of increased demand already recorded, the factory has made arrangements to more than double the daily output of LifeGuards.

To acquaint the public with the importance of Goodyear LifeGuards as a safety factor in driving, six crews of demonstrators from the factory will completely cover the country this season. Already more than 100,000 persons have seen the demonstrations in over 150 cities and towns. Cars equipped with LifeGuards are run over steel plates studded with sharp spikes at speeds of as high as 70 miles per hour, or tires are purposely destroyed by dynamite caps at these high speeds. When the tire is destroyed, the LifeGuard remains inflated and assumes the load so that the driver is able to bring the car to a smooth stop.



Comparison of the 24.00-32 Truck Tire Built by Goodyear, with 6.00-16 Tire for Automobiles; Mold in Which the Big Tire Was Cured Is in the Foreground

Goodyear sales representatives in charge of the several crews follow: B. J. Arnquist, R. F. Billow, D. M. Mayntier, C. C. Gibson, L. P. Irons, and A. G. McConky.

That LifeGuard dealers may have every assistance in letting their communities know about LifeGuards, Goodyear has provided a LifeGuard sales package full of aids to selling.

Another feature of the campaign is a three-reel sound motion picture made in Hollywood, "Always Trust a Life-Guard." A silent version of the film can also be obtained.

Standard A.S.T.M. Abrasion Compound Available

During the past several years, Subcommittee XIV on Abrasion Tests, of the A.S.T.M. Committee D-11 on Rubber Products has conducted a rather comprehensive cooperative test program to determine if it were possible to establish one or more standard rubber compounds, prepared by a central laboratory, having certified physical properties. The initial work was limited to abrasion resistance using the du Pont abrader.

The results of this work indicate conclusively that it is feasible for various laboratories to correct their abrasion indices to a common standard supplied in this way. A wide variation in the abrasive characteristics of paper furnished by different sources discloses an urgent need of some means of maintaining a standard for the industry. The establishment of a standard compound offers a solution to this need. The committee feels that the availability of abrasion standards is an important accomplishment. Experience and studies with the samples during the past six months have indicated that they can be maintained within ±5%. This is considered an unusual result for a mechanical service test of this nature.

The V. L. Smithers, Inc., laboratories, Akron, O., have undertaken to supply these abrasion standards certified to have an abrasion resistance of 200 ±5%. This service is supplied on a quarterly basis for those laboratories which wish to keep their abrasion testing apparatus calibrated over extended periods of time. Further details can be obtained from V. L. Smithers, Inc.

Toledo Rubber Products Corp., Middlefield, held an election of officers at the annual stockholders' meeting last month, as follows: president, Smith M. Johnson; vice president, E. M. Belknap; general manager, E. W. Coble; secretary, D. W. Moore, Jr.; treasurer and assistant secretary, L. M. Silverthorne. Excellent business was reported for 1937.

Eagle-Picher Lead Co., 1935 Temple Bar Bldg., Cincinnati, held its annual meeting on March 24 at which Assistant Treasurer Carl A. Geist was elected a vice president.

Firestone Tire & Rubber Co., Akron, recently shipped a Latex Whip pilot's seat to Spartan Aircraft Co., Tulsa, Okla., on the first United Airlines flight out of Akron. This shipment marked the beginning of Firestone's tenth year as a user of air express. Firestone officials last month attended a dinner-meeting at the Hotel Hildebrecht, Trenton, N. J., at which about 200 persons were present.

The Seiberling Rubber Co., Akron, recently moved its St. Louis, Mo., warehouse and offices from 4455 Duncan Ave. to the one-story building containing 5,000 square feet of floor space at 625 S. Sarah St. Herbert J. Halstenberg is manager of the St. Louis office. Sales Promotion Manager R. L. Baumgardner also announced that Seiberling plans to move its Dallas factory branch to 707 Woyng St.

Correction

Through error the signature in the advertisement of the National Rubber Machinery Co., Akron, on page 17 of the April issue of INDIA RUBBER WORLD listed its export office as being in New York. The signature should have instead listed the export representatives of the company as David Bridge & Co., Ltd., Manchester, England, and The Bawden Machine Co., Ltd., Toronto, Canada, whose names have appeared properly in previous advertisements of the National Rubber Machinery Co.

MIDWEST

TRADE in the Midwest reflects the sentiments of the rest of the country. Automobile assemblies last month showed a slight gain, after several weeks at a steady level. Automobile sales, however, remain disappointing. Production in novelty lines of women's shoes remains active, although wage cuts are contemplated in the industry. Truck farming prospects, though, improved.

The Harnischfeger Corp., Milwaukee, Wis., manufacturer of traveling overhead cranes, excavators, etc., recently appointed H. S. Strouse as vice president. Along with the duties of his new position Mr. Strouse will continue to direct the activities of the treasurer's department which he has headed for the past seven years.

Chicago Mold & Machine Co., manufacturer of molds for rubber products, has moved from 1715 West Lake St. to 4211 West Lake St., Chicago, Ill.

C. Legrande Smith has resigned his position with W. H. & L. D. Betz, Philadelphia, Pa., to take up new duties with the Minnesota Mining & Mfg. Co., 411 Piquette St., Detroit, Mich., where he will be connected with the cement division of the company.

Monsanto News

Monsanto Chemical Co., St. Louis, Mo., stockholders on March 22 held their annual meeting at which the following were elected to the directorate for the ensuing year: Edgar M. Queeny, John W. Livingston, Charles Belknap, Theodore Rassieur, Gaston Du Bois, G. Lee Camp, Walter W. Smith, William M. Rand, L. F. Nickell, and John C. Brooks. At the directors' meeting on March 23 the present officers of the company were reelected, and John C. Brooks was elected a vice president. The officers follow: Mr. Queeny, president; Mr. Belknap, executive vice president; Messrs. Du Bois, Camp, Livingston, Rand, Brooks, and Russell John Hawn, vice presidents; Victor E. Williams, J. A. Berninghaus, Mr. Nickell, Lynn A. Watt, Osborne Bezanson, Harvey M. Harker, and Daniel S. Dinsmoor, assistant vice presidents; Samuel W. Allender, assistant to president; W. W. Schneider, secretary; J. R. Mares and Charles E. Caspari, Jr., assistant secretaries; Daniel M. Sheehan, comptroller; E. J. Cunningham, J. W. Ludwig, and William I. Warren, assistant comptrollers; Fred A. Ulmer, treasurer; Stephen Louis and J. F. Martin, assistant treasurers.

Annual Report to Employes

Monsanto recently released a special edition of its annual report for 1937, which was mailed to employes of the company, marking the first time the organization has adopted such a policy. Among the points covered in the report from President Queeny are: "Who Are Our Stockholders and Why Is It Necessary to Report to Them Every Year?" "Why Do We Have Stockholders?" "Where Does the Employe Fit into This Picture?" "What Does the Stockholder Get . . . and What Do I Get?" "But Who Is the 'Real' Boss?" "What Is Back of My Job?" "What Effect Has the Current 'Depression' Had?" "What Is Being Done to Offset 'Depressions' as They Occur?" "Do Our Stockholders Risk Their Money in Any Other Way?" "What Is Done with the Money Monsanto Earns—and How Much Is My Share?" "Was 1937 a Profitable Year for Monsanto?" "What about 1938?" the Fiberloid Acquisition; Future Outlook; Assets and Liabilities; "Some Additions of 1937;" and "Who Are Your Directors?" The booklet also is well illustrated.

"Cameron pH Recorder." Wilkens-Anderson Co., 111 North Canal St., Chicago, Illinois. 4 pages. Illustrated. This circular describes the Cameron pH recorder. The instrument, which uses the glass electrode as the actuating element, provides for automatic pH recording and the means for controlling processes involving this factor.

NEW ENGLAND

MANUFACTURING activity in New England shows no improvement; some lines are more depressed than they were three months ago. The demand is better for some grades of cotton goods, but this is largely the result of reports of further curtailment by cotton mills. Mill consumption for raw cotton in February was the lowest for that month since 1921. The shoe business, though is fair.

The H. O. Canfield Co., manufacturers of molded specialties, plumbers' rubber goods, valves, gaskets, hose washers, and cut washers of all kinds, Bridgeport, Conn., has changed the address of its Chicago, Ill., office from 320 W. Illinois St. to 424 N. Wood St.

Dr. Harry L. Fisher, of U. S. Industrial Alcohol Co., Stamford, Conn., gave a talk, "Rambling Rubber Remarks," before the Science Club of Williams College, Williamstown, Mass., on March 21.

Summer Course in Colloid Chemistry

The Massachusetts Institute of Technology, Cambridge, Mass., recently announced the third special summer program in theoretical and applied colloid chemistry and physics to be held under the direction of Dr. E. A. Hauser, for five weeks beginning June 13. The program will consist of lectures, round-table discussions, and laboratory investigations.

This course should be of special interest to members of the rubber industry. Directed toward a general introductory survey of colloid chemistry and physics, the course will present the most recent viewpoints in this field of science. The past years have demonstrated that colloid chemistry and physics and their respective teaching are of predominant importance in rubber technology.

Problems such as the wettability of compounding ingredients, the influence of improved wettability on certain properties, such as tensile strength, tear resistance, lamination, reenforcement, etc., will be discussed in detail. The latest information on the structure of rubber will be given, with its bearing on the construction and shaping of various rubber goods. Theories of vulcanization, including latest developments, will also have their place in the program, and their importance in the manufacture of various rubber goods will be emphasized.

All applications and correspondence pertaining to the course should be sent to Dr. E. A. Hauser, Massachusetts Institute of Technology, Cambridge, Mass.

Bridgeport Company Reports to Job Holders

Robert R. Wason, president of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., personally discussed the company's 1937 operations with the employes assembled in a local auditorium. Lantern slides were used to explain in detail the distribution of income into materials, wages, salaries, and profits and the portion of profits that were reinvested into plant and equipment. Mr. Wason said he believed that the men and women who work for a business have as much right to have this information as do the stockholders.

Of interest was the fact that approximately 84% of the 1937 income came from new products developed by the company since 1932. Forty-five per cent. of the Bridgeport employes are over 40 years old, and 44% have worked for the company more than five years. After the report Mr. Wason frankly answered questions written on slips of paper by the employes during this discussion.

Stating that he believed the business outlook was not so bad as sometimes described, he concluded with the statement, "What business needs today is a chance to settle down and go to work."

Fisk News

The development of a device to duplicate various stresses and strains affecting bead wire under actual road service operation, has been announced by the product development department of the Fisk Tire Co., Chicopee Falls, Mass., and is believed to be an important advancement in tire technological research. Tests conducted have demonstrated not only essential fatigue points, but other vital factors relative to desired types of coating, kinds of steel—whether basic or acid—methods of wire drawing and temperature treatment, and allied data. As a result of the data established, safety factors now incorporated in bead wire used in current Fisk tire production is said to be better than eight times normal operating requirements.

The new test device is a laboratory model consisting merely of a rotating wheel with various radii over which the bead wire to be tested is suspended and held in tension by a 300-pound weight. At the other end of the wire is a small chuck arrangement attached to a motor which rotates the wire in a lateral and twisting motion. Motor revolutions are indicated on a speedometer.

The tests, operated for a fatigue period of six to eight hours, subject the wire to operating stresses and strains, such as: inflation pressure, bending, twisting or flexing action, and starting and stopping torques. The tests are said to be the equivalent to two years of actual road service conditions.

C. L. Bullock, head of Fisk's patent department, reported recently that the company has been granted patent rights by the Belgian Government on its new "Safti-Flight" tire. Fisk now controls approximately 500 active patents in the rubber and tire manufacturing fields. Its new tire, technicians claim, will stop an automobile from one to two carlengths shorter than any conventional tire.

American Tires Maintain Leadership

Despite recent research gains that have brought European tire manufacturers close on the heels of United States scientists, this country's leadership is not seriously threatened, Walter J. Geldard, chief chemist at Fisk, recently declared.

"Our natural problems have forced us into the lead and will keep us there."

American tire manufacturers have spent $55,000,000 on research in ten years to produce tires that would meet satisfactorily varying road and weather conditions in the 48 states. They have had the added incentive of meeting a great demand, he said. Foreign scientists have lagged because they did not have to meet the same strenuous conditions. In England, for example, the average driving speed and temperature are lower. A tire that gives good service in London might be unsatisfactory here.

"While these conditions remain," Mr. Geldard concluded, "the United States will undoubtedly maintain her research lead."

Automatic Machine Co. Reorganizes

Following the confirmation of a plan of reorganization in 77-B proceedings by the Hon. C. C. Hincks of the United States District Court in New Haven, Conn., recently, the Automatic Machinery Mfg. Corp. has been organized to carry out the provisions of the plan and succeeds to the business and assets of The Automatic Machine Co. George L. Sexton, president of the old company, will remain as president and general manager of the new organization. It is announced also that the active personnel of The Automatic Machine Co. will continue.

The new corporation is now producing semi-automatic and automatic boring machines using diamonds, tungsten-carbide and tantalum-carbide, thread hobbing machines, hand and automatic profilers, hydraulic and automatic threading lathes, cam milling machines of barrel and periphery types, variable speed hand milling machines, automatic valve body and wedge facing machines together with open-side shaper-planers.

OBITUARY

C. E. Cook

CLARENCE EDWARDS COOK, general sales manager of mechanical goods, The B. F. Goodrich Co., Akron, died on April 16 after a lengthy illness. He joined the company in 1898 as a clerk, but in 1901 went to the People's Hard Rubber Co. The next year he became a salesman for the Gutta Percha & Rubber Mfg. Co. In 1905, however, he returned to Goodrich as a salesman. In 1911 Mr. Cook was made Pacific Coast manager and in 1917 was named manager of branch operations in Akron. Two years later he was appointed manager of mechanical, footwear, and sundries sales and in 1926 was elected a director of the company. Mr. Cook was born April 10, 1880, in Cleveland, O., where he attended local grade, high, and business schools.

He was a 32nd degree Mason, Knight Templar, and a member of Tad Moor Shrine, Akron City and Lotos clubs.

Surviving are his wife and a sister.

Funeral services were held April 20. Interment was in Lakeview Cemetery, Cleveland.

Wm. H. Chidester

WILLIAM H. CHIDESTER, for the past 22 years president and treasurer of The Carter Bell Mfg. Co., 150 Nassau St., New York, N. Y., of which he also was one of the organizers in 1903, died suddenly on April 7. He was born in New York, but was educated in the schools of Jersey City, N. J. He leaves his wife, a son, and a daughter.

H. S. Maddock

HAROLD S. MADDOCK, 47, receiver of Essex Rubber Co., Trenton, from July 8, 1931, to October 6, 1936, died of a heart ailment on April 1. He was also a sales promotion expert and a former pottery manufacturer. Mr. Maddock, who was an alumnus of Mercerberg Academy, leaves a wife and three daughters. Burial was in Trenton.

Charles W. McKone

CHARLES W. McKONE, international rubber engineer, died on April 4 in an Akron, O., hospital. He was born in Hartford, Conn., 51 years ago. He graduated from Trinity College, where he won a Heidelberg scholarship and a Phi Beta Kappa key. Mr. McKone received his master's degree and Ph.D. from Columbia University.

For a time he was superintendent of the tire and tube and druggists' sundries departments of the Gordon Tire & Rubber Co., Canton, O. Later the deceased became a founder and vice president of the McKone Tire & Rubber Co., Millersburg, O., but subsequently sold out his interest in the firm. He was also a vice president and general manager of the National Tire & Rubber Co., East Palestine, O. Then, from 1929 to 1934, he acted as Soviet Russia's chief technical adviser in the rubber industry. Next he went to Belgium, from which point he toured the Continent as consulting engineer for English, French, Belgian, and Italian rubber concerns. In 1936, however, Mr. McKone returned to Akron to conduct independent research.

Surviving are his wife and two sons.

Funeral services were held on April 5 in Akron. Cremation took place in Cleveland.

NEW JERSEY

THE rubber industry in New Jersey shows little, if any, improvement. The only increase in production is in jar rings and druggists' sundries. Mechanical goods, hard rubber, and tiling remain below normal. A few smaller manufacturers report a small increase in orders.

Pierce-Roberts Rubber Co., Trenton, reports an uplift in business, with a second shift being placed at work. Treasurer Clifford A. Pierce and Mrs. Pierce have returned from a three-week motor trip through the South.

Mercer Rubber Co., Hamilton Square, finds business improving in mechanical goods.

Raybestos-Manhattan, Inc., Passaic, last month held its annual stockholders' meeting at which President Sumner Simpson reported a net loss of about $180,000 for the first quarter of 1938. This loss was equal approximately to the company's charges for depreciation in this period so that operations about broke even on a cash basis, he declared. Sales were $3,522,000, against $6,563,000 in the first quarter of last year. Mr. Simpson saw nothing favorable in the outlook for the second quarter.

Near Para Rubber Co., manufacturer of reclaimed rubber, Trenton, reports curtailed business. An official said he believed conditions would improve shortly.

The Charles Helmuth Printing Ink Corp., 154 W. 18th St., New York, N. Y., has leased a large portion of the plant of the Michelin Tire Co., Milltown, N. J.

Goodall Rubber Co., Inc., Trenton, has appointed G. J. Wyrough chief chemist. He was formerly with the Republic Rubber Co., Youngstown, O., and the Thermoid Co., Trenton.

Essex Rubber Co., Trenton, on March 1 held its annual stockholders' meeting at which the following directors were elected: Owen Moon, George T. Oakley, Arthur E. Moon, L. M. Oakley, H. Brunner, J. H. Frederick, E. H. Comly, and J. A. Austin. Then the board elected as president Owen Moon, succeeding Joseph F. O'Shaughnessy, resigned, and reelected George Oakley vice president, Arthur Moon secretary-treasurer, and L. A. Case assistant secretary-treasurer. The new president was at one time a treasurer of the company. Mr. O'Shaughnessy was formerly co-receiver at Essex and previously general manager of the tire department of United States Rubber Co., New York. Vice President Oakley has announced that a marked increase in business the past few weeks has necessitated increased production in virtually every department, and the company is operating three shifts, five days a week. Essex makes mechanical specialties and rubber soles and heels.

Hamilton Rubber Mfg. Co., Trenton, has a night shift at work in the jar ring department. Production of mechanical goods remains normal.

Luzerne Rubber Co., Trenton, will not rebuild at this time the large warehouse recently destroyed by fire, but will rent another structure. An executive stated that when business improves, a new warehouse will be erected.

The Calco Chemical Co., Inc., Bound Brook, N. J., announced that on March 31, 1938, the American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., acquired the assets of Amalgamated Dyestuff & Chemical Works, Inc., Newark, N. J., manufacturer of aniline colors and coal-tar products, and that the plant formerly operated by Amalgamated Dyestuff has been turned over by American Cyanamid to Calco to be operated as one of its manufacturing divisions. Calco is a wholly owned subsidiary of American Cyanamid. At the same time when the assets of Amalgamated Dyestuff were acquired by American Cyanamid, the latter also acquired the assets and business of John Campbell & Co., 75 Hudson St., New York. The business heretofore carried on by John Campbell & Co. in the sale of dyestuffs and related products will hereafter be continued at the same location by a newly formed company under the name of John Campbell & Co., Inc.

Armstrong Cork Co., Lancaster, Pa., through President H. W. Prentis, Jr., announced the consummation on March 31 of an agreement to purchase the Whitall-Tatum Co., Millville and Keyport, N. J. The actual purchase of Whitall-Tatum, if present plans are car-

(*Continued on page 77*)

Rubber Industry in Europe

GREAT BRITAIN

Amended Basic Quotas

At its meeting in London, March 29, the International Rubber Regulation Committee recommended certain amendments to the basic quotas, indicating that the claims of various rubber-producing countries in the Far East for higher basic quotas have received due consideration. The amended basic quotas for 1939-1943 follow, and for the sake of completeness the basic quotas of Siam and the Indo-China voting basis, together with the minimum permissible exports of the latter two countries, have been added.

Amended Basic Quotas Recommended by Committee

	Long Tons 1939	1940	1941	1942	1943
British Malaya	632,000	642,500	648,000	651,000	651,500
Netherland Indies	631,500	640,000	645,500	650,000	651,000
Ceylon	106,000	107,500	109,000	109,500	110,000
India	17,750	17,750	17,750	17,750	17,750
Burma	13,500	13,750	13,750	13,750	13,750
North Borneo	21,000	21,000	21,000	21,000	21,000
Sarawak	43,000	43,750	44,000	44,000	44,000
Siam	54,500	55,300	55,700	56,000	60,000
Indo-China	80,000	80,000	80,000	80,000	80,000
Total	1,599,250	1,621,550	1,634,700	1,643,000	1,649,000
Minimum Permissible Exports					
Siam	41,000	41,000	41,000	41,000	41,000
Indo-China	60,000	60,000	60,000	60,000	60,000
Total	101,000	101,000	101,000	101,000	101,000

It will be noted that Ceylon, Burma, North Borneo, and Sarawak have all received higher basic quotas than those suggested in the preliminary draft of the revised International Rubber Regulation Agreement released February 22, 1938. The amended figures give Ceylon an additional 8,000 tons a year; Burma, 1,500 tons a year; North Borneo, 2,000 tons more in 1939, 1,750 tons more a year in 1940, 1941, 1942, and 1,250 tons more for 1943; Sarawak, 4,000 tons more a year except in 1940 when the increase is 4,250 tons.

Chlorinated Rubber Paint

Highly satisfactory results in protecting steel against corrosion by the use of Detel have been reported in both the *Bulletin of the Rubber Growers' Association* and the London *Rubber Age*. According to the latter, Detel is a low viscosity chlorinated rubber in liquid form prepared according to a special process developed by F. C. Dyche-Teague. It appears that as early as 1931 a small plant for its production on a commercial scale was started by Detel Products, Ltd., at Walthamstow. This company, of which Mr. Dyche-Teague is the technical director, opened new works at Greenford, Middlesex, in 1934.

Detel, an entirely British invention, can be applied by brush or sprayed like paint, drying in about two hours when a tough, strongly adherent, non-poisonous, non-inflammable film is formed. It can be used not only on various metal surfaces, but also on wood, stone, plaster, concrete, asbestos, paper, leather, fabrics, etc. The coating is claimed to resist almost every known acid, even hydrofluoric acid, and every alkali; it gives complete protection against atmospheric influences and remains unaffected by sea water, alcohol, dry heat up to 200° F., and water saturated heat up to 120° F.; finally it is a high-grade electrical insulator.

In addition to Detel itself, a variety called D.M.U., or Detel metal undercoat, has been specially prepared for steel protection. Various instances are quoted to show how well Detel stands up in practical use. On a steamer running regularly between Southampton and the Isle of Wight, a strip 18 inches wide was painted along the water line, and the whole surface afterward given two coats of anti-fouling composition. After 12 months in service that part of the hull treated with Detel showed no trace of pitting or corrosion. Again, a gasoline pump at Shoreham-by-Sea was painted with a priming coat of D.M.U. and then with Detel aluminum. After 4½ years' exposure to sea air and southwest gales, it is said to be still in excellent condition.

New Chemicals Firm

Harold Wilson, whose interests are now merged with those of Witco, Ltd., forming the new firm of Harold Wilson & Witco, Ltd., 6 Portman Mansions, Baker St., London, W.1, England, brings to the new company a long and varied experience in the selling of pigments, colors, and other chemical products. Mr. Wilson started his career as a salesman and French and English correspondent for a color merchant's business in Germany and later spent 14 years traveling in every part of Europe representing English and German manufacturers as a color salesman. In 1900 he founded his own firm of Harold Wilson & Scholz, with Rudolph Scholz as his partner. This firm grew until it was doing a world-wide merchandising business in colors. When the World War came, Mr. Wilson's connections in Germany were severed completely, but he rebuilt his business in London under his own name. This also was successful, and the present connection with Witco, Ltd., a young but already widely known London firm associated with Wishnick-Tumpeer, Inc., of New York, creates a company that carries on an extensive business throughout the world in raw materials for the paint, rubber, printing ink, and allied industries.

Harry Fryer Schofield has been appointed to cover sales to the rubber industry for Harold Wilson & Witco. Mr. Schofield is an associate of Manchester College of Technology and an associate of the Institute of Chemistry and has had wide experience in the rubber field, both as a technician and as a sales representative. From 1920 to 1929 he was assistant and finally research and manufacturing chemist for I. C. I., Ltd., on organic dyestuffs and rubber chemicals. From 1929 to 1938 he was technical representative for the Rubber Regenerating Co., Ltd., covering Great Britain and most of Europe on rubber chemicals. This period of his service included some months in the United States at the laboratories and offices of the United States Rubber Co. and Naugatuck Chemical. He was sales manager during his last four years with the Rubber Regenerating Co., Ltd.

Notes

A new type of shoe, marketed by Veltex Shoe Co., Ltd., Edinburgh, has a sole consisting of a combination of the finest chrome leather and latex. The shoes are put out in several attractive styles with uppers of various modish fabrics.

Synthetic Rubber Products, Ltd., London, recently was established with a capital of £5,000 to manufacture and deal in rubber, balata, gutta percha, vulcanite, ebonite, and similar natural and synthetic substances and compositions.

Interesting experiments to test the resistance of Neoprene to chemicals have been carried out by David Mose-

ley & Sons, Ltd., Manchester. In one test the resistance to paraffin was investigated. Two rollers were used, one made from a mix containing Neoprene and the other without Neoprene. The rollers were left in paraffin for 12 months after which the first, containing Neoprene, was found to be quite unaffected, whereas the second, without Neoprene, was swollen to twice its normal size and showed extensive disintegration.

Imperial Chemical Industries, Ltd., is offering a new pigment dyestuff for rubber known as Vulcatex Fast Blue G.S. It gives a greener shade than Vulcatex Fast Blue B.S., and a wider range of brilliant greens is obtainable when it is used with Vulcatex Yellow 2 G.S. (G).

Visitors to London

A number of American rubber technologists contemplate attending the London Rubber Technology Conference to be held May 23 to 25 in London, England. Among those who are known to have made definite arrangements are A. R. Kemp, Bell Telephone Laboratories, Inc., 463 West St., I. Drogin, J. M. Huber, Inc., 460 W. 34th St., and Wm. B. Wiegand, Columbian Carbon Co., 41 E. 42nd St., all of New York, N. Y. Messrs. Kemp and Drogin will sail May 12 on *S.S. Champlain,* which is scheduled to arrive on May 19, and Mr. Wiegand has made reservations on *S.S. Britannic,* which sails May 14 and arrives on May 22.

EUROPEAN NOTES

Belgium

Although Belgium has a comparatively well-developed rubber industry of her own, she imports a considerable amount of rubber goods, including automobile tires. In 1937 tire imports came to 2,418,300 kilos, against 2,568,-500 kilos in 1936. Of these amounts America shipped 584,800 kilos in 1937 and 454,500 kilos in 1936.

Italy

The Societa Pirelli Italiana, Milan, proposes to increase its share capital from 200,000,000 to 300,000,000 lire. It will distribute a 13% dividend for 1937 against 12% the year before.

Holland

At Hilversum has been established a branch of the Société d'Etudes des Applications du Caoutchouc, of Champigny-sur-Marne, France. This is a scientific laboratory for carrying out research work in connection with applications of rubber and is directed in Holland by H. Kolodziev and Dr. F. Bondy.

GERMANY

Imports and Exports

In 1937 German crude rubber imports reached the unprecedented amount of 999,626 quintals, against 734,150 quintals for 1936. Totals of imports for January and February of the current year show a sharp decline, when compared with figures of the corresponding months of 1937, and a still greater decrease from the amounts entering the country toward the end of 1937.

Imports of manufactured goods were 224,558 quintals, value 7,012,000 marks, against 28,363 quintals, value 3,856,000 marks. The enormous increase in the quantity of imports together with a comparatively small increase in the value is due to the inclusion of considerable amounts of old tires among the imports of 1937.

Exports rose from 164,291 quintals, value 40,259,000 marks, to 189,091 quintals, value 47,816,000 marks. The favorable development in exports was almost wholly due to the considerable expansion in the shipments of cycle tires and tubes. The former rose to 1,814,767 units from 1,003,902 in 1936, and the latter, to 2,021,170 units against 990,622 units. Belting, which came to 3,989 quintals, against 3,333 quintals; packing, 2,309 against 1,876 quintals; hose, 13,258 against 10,764 quintals; rubberized fabrics, 21,766 against 17,194 quintals; were among the other items of export which increased in 1937. But decreases occurred in the exports of automobile tires, from 271,527 units to 250,524 units; automobile tubes, from 145,171 to 143,659 units; and footwear, from 333,-307 to 303,293 pairs.

Leipzig Spring Fair

The Leipzig Spring Fair, which opened March 6, was in many respects very successful. To begin with, a large number of foreign firms were among the exhibitors, but what was of more importance for local business was the unusually full attendance by foreign buyers. This did not fail to have its effect on business, and transactions in various rubber lines were reported to have been excellent.

This year again the importance of synthetic materials for Germany was stressed at the fair. There did not appear to be any important new materials on view that had not been shown last year, but the applications had been considerably extended; consequently the range of goods shown was much larger. Rubber manufacturers are using more and more Buna, alone or in combination with natural rubber, and most stands displayed goods of Buna. At the Sample Fair, Buna was used in the manufacture of rubber aprons, panties, and bathing shoes featured by Atlantic Gummiwerke Aloys Weyers, Koln-Braunsfeld. Deutsche Kabelwerke, A.G., Berlin, better known as Deka, had Buna aprons. The firm's new Cumaherina gloves powdered with a highly antiseptic, but non-irritating silver powder attracted attention. Technical articles of Perduren, Oppanol, and Buna were on display at the stand occupied by Flugel & Polter; and Zieger & Wiegand featured, among other items, rolls made of Buna. Endless woven belts coated with Buna to render them oil-resistant were seen at the stand of Gebr. Koter, Leipzig. The belts are intended for heavy duty and are exceptionally thin. Synthetic rubber rolls for the printing industry, now put out by Gummiwerke Elbe, were on view at the Bugra Fair at the Leipzig Fair.

"Thiokol" A, made in a factory at Saarau, was displayed for the first time at the Technical Fair of the Leipzig Fair. The unvulcanized raw material was shown as well as a number of finished articles intended to resist benzene, organic solvents, mineral oils, etc.

Guttasyn, the gutta-percha-like material developed by H. Rost & Co. and first exhibited at last year's fair, was again featured. It is used for various kinds of tubing and packing.

Also shown were metal parts, particularly pipes, coated with an extremely thin, uniform, and non-porous hard rubber layer, after the process of the Hagusta concern of Frankfurt a.M., and Continental's metal-rubber combinations for couplings and suspensions for machines.

Rubber Import Duty Up

German duties on crude rubber and latex keep going up as the price goes down, to prevent too great a difference between the price of the natural material and Buna. Effective March 21, 1938, the duty on rubber, gutta percha, balata, raw or refined, was fixed at 170 marks per 100 kilos instead of 160 marks. On latex with a dry rubber content of 46% and under the duty now is 64 marks per 100 kilos instead of 60 marks; on 46% to 66% latex, 97 marks per 100 kilos instead of 91 marks; and on 66% to 81% latex, 121 marks per 100 kilos instead of 114 marks.

Austria

In 1937 Austria's crude rubber imports rose to 42,006 quintals from 38,651 quintals the year before. Total imports of manufactured rubber goods also increased, 12,329 quintals, value 8,189,000 schilling, against 12,158 quintals, value 7,467,000 schilling, in 1936. But exports fell 30,861 quintals, value 16,968,000 schilling, in 1936 to 27,574 quintals, value 16,932,000 schilling, last year. While auto tire imports rose from 4,360 to 4,615 quintals, exports of these goods fell from 3,628 to 1,824 quintals. Footwear

(Continued on page 72)

Rubber Industry in Far East

NETHERLAND INDIA

Restriction Developments

The recommendation by the International Rubber Regulation Committee to permit new planting up to 5% of the existing rubber area is likely to bring some new problems with it, at least as far as its application to native growers is concerned. It will readily be understood that to grant permission to the many thousands of native growers individually to extend their holdings would offer many practical objections. A way out may be sought by allotting the 5% increase to districts instead of to individuals. Whatever the solution, it will have to be found soon if growers are to be in a position to prepare for expansion in time.

Another angle is touched upon in the report on the Netherland India budget for 1938 when it was suggested that since natives on the whole did not have adequate planting material available for immediate planting, government should set aside funds to buy the necessary planting material for the benefit of the natives so that they too may profit by the permission to add to their planted area and be enabled to maintain their position on the world market.

To turn from native to estate rubber, a report in the local press reads that the Director of Economic Affairs had sent out a circular to those concerned, pointing out that the International Rubber Regulation Committee had intimated that there would be no objection to estates making preparations this year for the new planting to be started next year. Since there appeared to be no doubt, the circular continued, that the respective governments would agree to the committee's recommendations, it seemed to be justifiable to anticipate this agreement and permit estates to start laying out nurseries now in prepation for 1939 and 1940.

Later reports in connection with new planting state that a trade in planting permits has already sprung up and that quotations now range around 150 guilders per hectare; it is thought likely that the price may go as high as 200 guilders per hectare; though a price of 100 guilders is, of course, quite possible later.

West Java Experiment Station

The West Java Experiment Station has for some time been active in attempting to expand the possibilities for rubber. Recently it has been experimenting with a method for producing rubber powder. Now highly satisfactory results have been obtained indicating the possibility of producing a practically pure rubber powder from latex.

Good results are also said to have been obtained with a process for using rubber in road-making, by mixing latex with asphalt; a report on the latter tests is to be made at the International Roads Congress, soon to be held in the Hague, Holland.

New Latex Factory

With the erection of a large installation for preparing latex at the port of Belawan, the Rubber Cultuur Mij., Amsterdam, will find its efficiency greatly increased. The factory, being built on an area of 4,000 square meters, is expected to be ready for operation by July when all the latex from the various gardens of the concern will be sent up to Belawan to be prepared there and shipped direct to consumers. Hitherto the latex had first to be taken to one of the estate factories for treatment and then transported again from there to Belawan. It is not known yet whether the latex will be stored in tanks or drums.

Exports

Final figures of the Central Bureau of Statistics for January, 1938, show that Java and Madoera exported 4,548 tons of estate rubber, including 17 tons latex. In addition 20,858 kilos were shipped in the form of tires. Estates in the Outer Provinces sent 9,020 tons, dry weight, including 653 tons of latex. Native rubber exports amounted to 13,324 tons. The total for Netherland India for the month, therefore, was 26,913 tons.

New Rubber Exporter

It is learned from reliable sources that the well-known Japanese exporters, Mitsubishi Shoji Kaisha, have opened an agency at Batavia to handle the exportation of rubber and tin. This concern already has a large office at Soerabaia, which handles chiefly imports, while the exports, which include such Netherland India products as sugar, maize, copra, do not cover rubber. The reason for this new move is said to be that Japanese import and export trade is experiencing difficulties in the Straits Settlements and that consequently Japanese commercial houses are turning their attention more and more to Netherland India. Up to a short time ago rubber firms in Japan obtained all their sheet and crepe from Singapore; now they are turning to Batavia.

Notes

The government is reported to be considering the advisability of having gas masks manufactured in Java, and it appears that a representative of the Singapore Rubber Works has been contacting various Netherland India authorities in this connection. Now local interests have submitted a request to the Department of Economic Affairs asking that Netherland India concerns be given first consideration in the matter of the production of gas masks.

The question of opening up Dutch New Guinea has been increasingly to the fore of late. Various schemes to effect this have been under consideration, among others one providing for the establishment of a Government Rubber Plantation in New Guinea.

JAPAN

Rubber Import Ruling

It is reported from Kobe that the Japanese Government has decided to allow rubber traders to import crude rubber grown on Japanese plantations in Malaya and elsewhere without exchange. This decision, it is hoped, will help to alleviate the rubber shortage in Japan and at the same time assist Japanese owners of rubber estates who, it appears, have been finding it difficult to ship their product to Japan. According to the same source, imports without exchange during the year will be limited to 50,000,000 yen.

Exports of Rubber Goods

Despite periodical setbacks Japan's exports of rubber manufactures continue to increase rapidly, a review of the last ten years indicates. In 1928 exports of all kinds of rubber goods represented a total value of 13,256,429 yen; by 1933 this had grown to 29,012,522 yen, and despite export difficulties, the record figure of 52,542,851 yen was reached in 1937.

Various countries have taken special measures to exclude Japanese footwear in particular; but this is still the Japanese rubber industry's main article of export, and shipments have risen

rapidly from 3,883,648 yen in 1928 to 8,213,073 yen by 1933 and to 23,273,657 yen by 1937. By far the greater part of this footwear consists of cheap rubber-soled canvas shoes. In 1937 about 12% were rubbers and shoes; while the strictly native type of footgear, now provided with rubber soles and known as zori and tabi, together represent approximately another 12%.

The foreign trade in tires and tubes has also been growing in importance, rising from a value of 5,724,861 yen in 1928 to 8,839,027 yen in 1933 and 12,983,198 yen in 1937. Exports of automobile tires have been expanding more rapidly than those of cycle tires and tubes and in 1937 represented more than half the total value; cycle tires and tubes accounted for about 38% of the total value, and ricksha and other tires for the rest.

Japanese trade in rubber toys developed by leaps and bounds, from 1928, when the total was 1,934,418 yen, to 1933 when the peak of 8,633,024 yen was reached. As a comparison with the figures for footwear and tire and tube exports for the same year indicates, the toy trade occupied a position between the two classes of goods, as far as value was concerned. But whereas the latter continued to grow in importance, exports of toys fell off from year to year until in 1937 they came to only 4,279,162 yen.

Among the other rubber goods exported, in 1937, belting took first place, with 2,981,437 yen, an increase of over 60% as compared with 1936; then came bands and threads, with a value of 1,672,916 yen, an increase of about 75% against 1936. Substantial gains were also booked by tennis balls, baseballs, and football bladders. In 1937 raincoat exports, value 1,573,779 yen, are separately mentioned for the first time.

MALAYA

The investigations on the constitution of latex[1] commenced a few years ago by K. C. Roberts at the Rubber Research Institute of Malaya, and first reported on in the June, 1936, issue of the *Journal of the Rubber Research Institute of Malaya*, have been continued and the January, 1938, issue contains Parts II, III, and IV of the series on "The Constituents of Hevea Latex."

Part II, headed "Seasonal Variations in the Composition of Typical Seedling Latex," covers the results of observations carried out with fresh latex over the period June, 1936-May, 1937, inclusive, and deals with the variations, qualitative and quantitative, of the "Ammonium Salt," the "Ester," "Fatty Acid Complex," "Phosphate Complex," "Crude Caoutchol," and the "Rubber Hydrocarbon."

Further knowledge gained since the first part was issued has made it necessary to change the names of two of the constituents: those now named Phosphate Complex and Crude Caoutchol correspond to the Protein Complex and the Sulphur Complex of Part I.

The investigation shows that certain of the constituents are subject to wide, almost daily, variations both in quality and quantity. These variations are either inherent in the tree or due to uncontrollable external factors, chiefly rainfall, wintering, and refoliation. The controllable factors—tapping system and genetic strain of the tree—are to be reported on at another time.

It was found that wintering appeared to be the main factor causing changes in the values for the fatty acid complex; whereas the crude caoutchol values were chiefly affected by the rainfall. These two components influence respectively the plasticity and elasticity of plantation rubber, and the variations to which they are subject are considered large enough to cause differences in the physical and mechanical properties of rubber. Variations in the other components do not appear to be significant from this point of view.

In Part III the results of "The Analysis of Plantation Rubber and of Creamed Latices" are given. The water-soluble phosphate complex was found to be the only constituent that differed quantitatively from the values found for fresh latex; the values were low and reflected the removal of the serum solids in the course of preparation.

Qualitative differences were due, first, to occasional inclusion of foreign matter introduced during manufacture and, second, to chemical changes produced by the action of ammonia.

"The Effect of Ammoniation on Latex" was specially treated in Part IV. These investigations showed that profound changes are produced by ammoniation which are far advanced in eight weeks. Within that period the fatty acid and the phosphate complexes of fresh latex undergo extensive hydrolysis, and part of the inorganic matter is firmly retained by the modified hydrocarbon. (See below.) The crude caoutchol of fresh latex is replaced by an increased amount of a viscous fluid which is thought to consist of a disaggregated portion of the hydrocarbon. Caoutchol itself, treated with dilute aqueous ammonia, becomes relatively insoluble and is presumably retained on analysis by the remainder of the hydrocarbon.

The hydrocarbon of fresh latex is replaced by an ash containing material which has a marked resistance to solvent action. The latter property is due not only to retention of the modified caoutchol, but also to modification of the hydrocarbon itself by the action of the ammonia.

[1] See INDIA RUBBER WORLD, Oct. 1, 1936, p. 71.

SOUTH AFRICA

The Leather & Rubber Division, Department of Commerce, Washington, D. C., recently pointed out opportunities for tire sales in South Africa. Motor vehicle registrations in the Union of South Africa rose 71% from 1929 to 1936; while the price of gasoline declined, and good roads were extended. Tire units sold in South Africa in 1937 were estimated at 366,000. United States tire exports to South Africa are now only about one-fifth the volume of 1929.

Since 1934, South Africa's importation of automobiles has expanded considerably with corresponding growth in the demand for tires. It is reported that the two domestic tire factories which have now reached their maximum output supply about 80% of local tire requirements. Local consumption of tires including retreaded tires is estimated at 366,000 units in 1937, against 240,000 units in 1936. The number of tires retreaded every month is put at about 5,000 units.

South African requirements of crude rubber have grown rapidly during the last few years. For 1935, imports came to only 1,553 tons, but in 1936 the figure jumped to 4,098 tons, and in 1937, to 6,200 tons. Imports of rubber tires and tubes, on the other hand, declined: 4,225 tons in 1936 and only 2,825 tons in 1937.

GERMANY

(*Continued from page 70*)

exports also fell sharply from 1,244 to 762 quintals. Bathing caps and toys were other export items that showed declines. On the other hand hard rubber goods, packing, hose, elastic webbings, and rubberized fabric exports advanced.

Now that Austria has become a part of Germany various German decrees regulating trade have become applicable to the former country also. A special decree issued March 19, 1938, is designed to prevent a sudden influx of German firms into Austria. The new ruling forbids any persons domiciled in Germany or established in business there on March 13, 1938, to establish new enterprises, factories, or even branches or agencies in Austria. Nor may they acquire or participate in existing businesses or factories in Austria or transfer their businesses or factories from Germany to that country. In special aces the government is empowered to relax the above rulings. This decree will remain in force until October 1, 1938.

YUGOSLAVIA

According to latest reports the Italian firm of Pirelli had been planning to erect a tire factory in Yugoslavia, but Bata was ahead of it. Now the Italian company is said to have decided to give up its Yugoslavian plans. It seems that Bata just completed building a factory for tires at Borovo which has a weekly capacity of 1,000 cycle tires and 150 automobile tires. These amounts are apparently enough to cover the greater part of the country's tire requirements.

Patents and Trade Marks

MACHINERY

United States

2,111,693. **Drive Mechanism for Rubber Mills.** C. F. Schnuck, New Haven, assignor to Farrel-Birmingham Co., Inc., Ansonia, both in Conn.
2,112,187. **Tire Mold.** H. Willshaw, Wylde Green, Birmingham, assignor to Dunlop Rubber Co., Ltd., London, both in England.
2,112,440. **Tire Vulcanizer.** H. V. James, Denver, Colo.
2,112,513. **Latex Tube Manufacturing Apparatus.** A. O. Abbott, Jr., Argentine Township, and G. K. McNeill, Detroit, both in Mich., and E. Hazell, New York, N. Y., and W. A. Gibbons, Montclair, N. J., assignors, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,112,783. **Tire Mold.** C. W. McKone, Washington, D. C.
2,112,976. **Machine for Compacting Shoe Uppers.** H. R. Polleys, New Haven, Conn., assignor to United States Rubber Co., New York, N. Y.
2,114,197. **Shoe Press.** E. A. Willey, assignor to Converse Rubber Co., both of Malden, Mass.

Dominion of Canada

372,930. **Paste Applying Apparatus.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of A. W. Keen, Passaic, and H. T. Trautvetter. Clifton, co-inventors, both in N. J., U. S. A.
372,940. **Rubber Rope Making Device.** Jem Rubber Co., Ltd., assignee of J. H. Johnson, both of Toronto, Ont.

United Kingdom

476,534. **Knitting Machines.** Scott & Williams, Inc.
477,204. **Form for Molding Rubber Articles.** International Latex Processes, Ltd.
477,287. **Mold.** General Motors Corp.
477,467. **Fender Form.** Firestone Tire & Rubber Co., Ltd.
477,658. **Heel Mold.** Wingfoot Corp.

Germany

657,964. **Ball Conveying Installation.** Deutsche Dunlop Gummi-Co., A.G., Hanau a.M.
658,217, 658,219, 658,271. **Tire Building Machine.** Deutsche Dunlop Gummi-Co., A.G., Hanau a.M.
658,272. **Swivel Joint for Vulcanizers and Molds.** L. Herbert, Frankfurt a.M.

PROCESS

United States

2,111,933. **Treating Fibrous Materials.** E. F. King, Cranston, R. I.
2,112,294. **Securing Covering Material to Elastic Strands for Elastic Fabrics.** S. C. Lilley, Hamden, assignor to American Mills Co., New Haven, both in Conn.
2,112,452. **Concrete or Cement Structure.** L. G. Copeman, assignor to Copeman Laboratories Co., both of Flint, Mich.
2,112,529. **Microporous Rubber.** E. Hazell, assignor to United States Rubber Co., both of New York, N. Y.
2,112,802. **Rubber Compounds.** J. Behre, Hamburg-Klein-Borstel, assignor to Lehmann & Voss & Co., Hamburg, both in Germany.
2,112,803. **Reclaiming Rubber.** J. Behre, Hamburg-Klein-Borstel, assignor to Lehmann & Voss & Co., Hamburg, both in Germany.
2,113,142. **Grinding Rings.** H. Randall, Hilden, Germany.
2,113,316. **Valves.** J. Bugatti, Molsheim, France.
2,113,498. **Rubber Process.** T. L. Shepherd, London, England.
2,113,728. **Lining Hollow Containers.** M. M. Harrison, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,114,004. **Knitted Fabric.** A. J. Reinthal, Cleveland Heights, assignor to Bamberger-Reinthal Co., Cleveland, both in O.
2,114,162. **Treating Rubber.** C. L. Beal, Cuyahoga Falls, assignor to American Anode, Inc., Akron, both in O.
2,114,275. **Producing Foam from Aqueous Dispersions of Rubber.** E. A. Murphy and E. W. Madge, both of Wylde Green, Birmingham, S. D. Taylor, Sutton Coldfield, and D. W. Pounder, Moseley, Birmingham, assignors to Dunlop Rubber Co., Ltd., London, all in England.

Dominion of Canada

372,783. **Printing Blanket.** Dewey & Almy Chemical Co. of Canada, Ltd., Farnham, P. Q., assignee of S. B. Neiley, Winchester, Mass., U. S. A.
372,809. **Seamed Bag Manufacture.** Paper Service Co., Lockland, assignee of W. W. Rowe. Cincinnati, both in O., U. S. A.
372,931. **Rubber Article Manufacture.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of G. G. Havens, Detroit, Mich., U. S. A.

United Kingdom

475,399. **Elastic Yarns.** M. Ponce.
476,506. **Tapes.** International Latex Processes, Ltd., and R. G. James.
477,213. **Rubber with Projecting Studs.** India Rubber, Gutta Percha & Telegraph Works Co., Ltd., and F. J. Clamp.
477,268. **Incorporating Cellulose Ethers in Rubber.** M. Bandli.
477,393. **Coating Yarns.** J. H. Fenner & Co., Ltd., J. H. Fenner, S. B. Hainsworth, and J. H. Anderson.
477,523. **Elastic Fabrics.** T. L. Shepherd.

Germany

657,712. **Rubber-Covered Fabrics.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands. Represented by G. and E. Wiegand, both of Berlin.

CHEMICAL

United States

2,111,427. **Rubberlike Product from Vegetable Oil.** H. G. Kittredge, assignor to Kay & Ess Chemical Corp., both of Dayton, O.
2,111,890. **Blue Coloring for Rubber.** E. Fischer, Offenbach-a.M., Germany, assignor to General Aniline Works, Inc., New York, N. Y.
2,112,517. **Leather Latex.** D. E. Cable, Rutherford, N. J., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,112,728. **Elastic Albuminous Composition.** S. Morgenstern, Berlin-Charlottenburg, and J. Eggert, Berlin, assignors to Deutsche Hydrierwerke Akt., Berlin-Charlottenburg, both in Germany.
2,113,599. **Lubricating Composition.** J. M. Musselman, assignor to Standard Oil Co., both of Cleveland, O.
2,114,251. **Chlorinated Rubber Composition.** P. Koch, assignor to J. R. Geigy, A.G., Basel, Switzerland.

Dominion of Canada

372,423. **Coating Composition for Printing Rollers.** Dayton Rubber Mfg. Co., assignee of A. L. Freedlander, both of Dayton, O., U. S. A.
372,453. **Latex Coating Composition.** Collins & Aikman Corp., Philadelphia, assignee of G. S. Hiers, Bala-Cynwyd, both in Pa., U. S. A.
372,621. **Vulcanizing Agents.** Canadian Industries, Ltd., Montreal, P. Q., assignee of I. Williams, Woodstown, N. J., U. S. A.
372,967, 372,968, 372,969. **Accelerator.** Wingfoot Corp., Wilmington, Del., assignee of W. Scott, Akron, O., both in the U. S. A.

United Kingdom

476,344. **Plastic Compositions.** Mead Corp.
476,481. **Latex Can Sealing Compositions.** Dewey & Almy, Ltd. (Dewey & Almy Chemical Co.).
476,555. **Latex Compositions.** G. C. Gaut, D. Swaddle, and Plessey Co., Ltd.
476,712. **Antioxidants.** B. F. Goodrich Co.
476,733. **Halogenated Rubber Compositions.** Marbon Corp.
476,743. **Chlorinated Rubber from Latex.** Rubber Producers Research Association, G. Martin, W. S. Davey, and H. C. Baker.
476,795. **Rubber Hydrochloride Compositions.** W. J. Tennant (Marbon Corp.).
477,014 and 477,015. **Antioxidants.** Standard Oil Development Co.
477,159. **Latex-Viscose Compositions.** A. G. Norman and S. G. Barker.
477,232. **Sterilized Latex.** D. Spence.
477,380 **Adhesive for Rubber.** Du Pont Rayon Co.
477,447. **Amorphous Rubber Hydrochlorides.** Marbon Corp.
477,980. **Latex Adhesives.** K. Stuart and G. B. Linderman.

478,305. **Rubber Compositions.** G. W. Johnson (I. G. Farbenindustrie A.G.).
478,437. **Antioxidants.** Wingfoot Corp.

Germany

657,843. **Plastic Masses from Latex Concentrates.** H. von Recklinghausen. Dessau.

GENERAL

United States

2,111,641. **Truck Mirror.** O. C. Ritz-Woller, Chicago, Ill.
2,111,642. **Candle Holder.** F. D. Saier, Upper Nyack, N. Y.
2,111,654. **Inhaler.** P. J. Wires, Indianapolis, Ind.
2,111,666. **Arch Supporting Sole.** D. C. Hubbard, Auburn, Me.
2,111,674. **Fluid - Pressure Operated Brake.** E. Oetiker, Zurich-Altstetten, Switzerland.
2,111,731. **Water Bottle.** M. B. Reach, Springfield, Mass.
2,111,841. **Atomizer.** H. E. Curry, Seattle, Wash.
2,111,982. **Liquid Sampler.** A. J. Mason, Jr., Bakersfield, Calif.
2,112,018. **Device to Eliminate Noxious Substances in Tobacco Smoke.** L. G. Gautron, Geneva, Switzerland.
2,112,027. **Refrigerator Tray.** R. E. Kaufmann, New York, N. Y.
2,112,095. **Roller.** F. Hoffmann, Lodz, Poland.
2,112,151. **Combined Brassiere and Bathing Suit.** R. Freedman, New York, N. Y.
2,112,266. **Elastic Pipe Connection.** J. Brand, Duisburg-Hamborn, Germany.
2,112,322. **Cable.** K. S. Wyatt, assignor to Detroit Edison Co., both of Detroit, Mich.
2,112,337. **Means to Draw off Slivers of Textile Fibers in Combing Machines.** P. J. Gillespie, London, England.
2,112,339. **Golf Tee Holder.** J. J. Kasparek, Oak Park, Ill.
2,112,345. **Garment Supporter Clasp.** J. R. Parker, assignor to F. P. Higgins, both of Toronto, Ont., Canada.
2,112,409. **Bathtub.** B. E. Prince, Charleston, W. Va.
2,112,462. **Squeegee.** N. Hawrylasz, Minneapolis, Minn.
2,112,483. **Tire Inflation and Deflation Detector.** F. Dilts, Lyons, Kan.
2,112,525. **Belt.** B. H. Foster, Maplewood, N. J., assignor to United States Rubber Products, Inc., New York, N. Y.
2,112,544. **Laminated Article.** H. D. Rice, Barrington, R. I., assignor to United States Rubber Products, Inc., New York, N. Y.
2,112,581. **Syringe.** G. E. Tacey, Detroit, Mich.
2,112,616. **Semi-Rigid Elastic Thread.** S. W. Alderfer, assignor to Andrews-Alderfer Co., both of Akron, O.
2,112,666. **Post-Surgical Gas Vent.** F. I. Fennell, Northville, Mich.
2,112,737. **Surgical Drainage Tube.** H. M. Dodge, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,172,769. **Fabric with Rubber Inlay.** J. L. Getaz, Maryville, Tenn.
2,112,788. **Garment.** G. W. Rosenberg, Elkins Park, assignor of fifty one-hundredths to S. P. Weinberg, Philadelphia, both in Pa.
2,112,892. **Garment Band.** H. Hardie and J. F. Hargreaves, assignors to Faultless Mfg. Co., Baltimore, Md.
2,112,893. **Garment.** A. J. Harwood, Richmond, Ind., assignor to Atlas Underwear Co., Piqua, O.
2,113,004. **Detonating Fuse.** W. O. Snelling, Allentown, Pa., assignor to Trojan Powder Co., a corporation of N. Y.
2,113,020. **Resilient Mount for Motors.** H. D. Geyer, Dayton, O., assignor to General Motors Corp., Detroit, Mich.
2,113,031. **Model Tire Wheel.** F. J. and G. B. Merz, Jr., and C. B. Merry, all of Seattle, Wash.
2,113,036. **Women's Nether Garment.** A. Steinhaus, Dallas, Tex.
2,113,056. **Quick-Stopping Safety Device.** C. McKinnon, Mindemines, Mo.
2,113,065. **Foundation Garment.** H. Wipperman, assignor to H. W. Gossard Co., both of Chicago, Ill.
2,113,066. **Tire.** C. G. Hoover, assignor to Firestone Tire & Rubber Co., both of Akron, O.
2,113,098. **Packer.** P. B. Skinner, Tulsa, Okla.
2,113,152. **Sealing Strip.** J. F. Johnston, Ravenna, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,113,183. **Inner Sole.** A. L. Sanchioni, Boston, assignor to D. N. Borkum, Brookline, both in Mass.
2,113,201. **Garment Band.** A. Scheitlin, Zurich, Switzerland.
2,113,372. **Spring.** E. E. Ellies, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,113,379. **Cushion Wheel.** E. F. Maas, Cuyahoga Falls, O., assignor to Wingfoot Corp., Wilmington, Del.
2,113,452. **Cleaning Device.** A. S. Long, Cedar Rapids, Iowa.
2,113,467. **Inflatable Ball.** D. Levinson, assignor to Standard Sports Mfg. Co., both of Chicago, Ill.
2,113,469. **Dress Shield.** E. W. Standley, Watertown, N. Y.
2,113,474. **Tire Pressure Indicator.** A. Edmonston and A. C. Duclos, both of Manila, Ark.
2,113,527. **Tire Construction.** J. E. Hale, assignor to Firestone Tire & Rubber Co., both of Akron, O.
2,113,542. **Draft Gear.** A. G. Dean, Narberth, assignor to E. G. Budd Mfg. Co., Philadelphia, both in Pa.
2,113,561. **Belt.** A. L. Freedlander, assignor to Dayton Rubber Mfg. Co., both of Dayton, O.
2,113,682. **Folding Bath Stand and Dressing Table.** C. T. De Puy, assignor to Trimble Nurseryland Furniture, Inc., both of Rochester, N. Y.
2,113,705. **Seat Guard.** E. E. Merrett, Ludington, Mich.
2,113,718. **Composite Fabric.** J. T. Callahan, Waban, assignor to Archer Rubber Co., Milford, both in Mass.
2,113,724. **Veneer Roll.** A. L. Freedlander and J. Rockoff, assignors to Dayton Rubber Mfg. Co., both of Dayton, O.
2,113,750. **Toy Vehicle.** B. Travis, Whittier, Calif.
2,113,938. **Plate Cushioning Means for Batteries.** W. L. Gill, Redlands, Calif.
2,113,957. **Pneumatic Tire Pressure Signaling Device.** E. C. Androsky, assignor of 50% to F. Androsky, both of Superior, Wis.
2,114,045. **Protector for Use in Renovating Shoes.** E. Brickner, Minneapolis, Minn.
2,114,222. **Shirt Stay.** L. L. Holben, Phillipsburg, Kan.
2,114,271. **Buttonhole Edging.** J. W. Sweeney, assignor to Narrow Fabric Co., both of W. Reading, Pa.

Dominion of Canada

372,456. **Inspection Cover.** Duffy Mfg. Co., assignee of J. F. Duffy, both of Holland, Mich., U. S. A.
372,526. **Container Closure.** D. B. Baxter, Glendale, administratrix of the estate of D. E. Baxter, deceased, in his lifetime of Los Angeles, both in Calif., U. S. A.
372,527. **Bandage.** H. V. Lucas, assignee of W. Fetter and F. A. Kemler, executrix of the estate of E. Fetter, deceased, all of Baltimore, Md., U. S. A.
372,531. **Shirt.** W. Meisler, Union City, and M. Wolf, Jersey City, co-inventors, both in N. J., U. S. A.
372,532. **Shoe.** A. Szerenyi and H. Rollmann, co-inventors, both of Brussels, Belgium.
372,540. **Diaper.** L. R. Caron, Hull, P. Q.
372,554. **Coffee Maker Seal.** S. W. Farber. New York, N. Y., U. S. A.
372,577. **Foundation Garment.** H. A. Smith, Fairfield, Conn., U. S. A.
372,614. **Curtain Fixture.** Adlake Co., Chicago, Ill., assignee of W. S. Hamm, Elkhart, Ind., U. S. A.
372,669. **Pneumatic Mattress.** Sampson Rubber Products Corp., Detroit, Mich., assignee of R. W. Sampson, New York, N. Y., both in the U. S. A.
372,687. **Windscreen Wiper.** F. G. G. Armstrong, Beverley, co - inventor with and assignee of H. Clayton-Wright, Stratford-on-Avon, England.
372,694. **Cigarette Case.** H. Auslander, New York, N. Y., U. S. A.
372,698. **Hair Drier.** J. L. R. Boudou, London, England.
372,774. **Liquid Layer Applier.** Compact Chemicals Ltd., assignee of J. M. Wilson, Glasgow, Scotland.
372,869. **Knitted Fabric.** H. A. Raynor, Nottingham, England.
372,873. **Vehicle Body.** C. E. Stevens, San Diego, Calif., U. S. A.
372,898. **Vest Back.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of P. Adamson, Rye, N. Y., U. S. A.
372,909. **Refrigerator Display Case.** American Hard Rubber Co., New York, N. Y., assignee of S. Bohn, Passaic, N. J., and H. D. King, Cuyahoga Falls, O., co-inventors, U. S. A.
372,936. **Graining Apparatus.** General Motors Corp., assignee of W. G. Bihler and H. J. Schuldt, co-inventors, all of Detroit, Mich., U. S. A.
372,971. **Ball.** G. Young & Co., assignee of A. E. Fegan, both of Chicago, Ill., U. S. A.
372,996. **Ball.** J. H. Grady, St. Louis, Mo., U. S. A.
373,045. **Diaphragm Seal** Detroit Hydrostatic Brake corp., assignee of C. Sauzedde, Detroit, Mich., U. S. A.
373,101. **Rubberized Garment.** J. M. Edwards, inventor, and D. P. Lambe, assignee of one-half of the interest, both of Bernard, Iowa, U. S. A.
373,104. **Electric Plug Cap.** W. A. Frantz, Shaker Heights, co-inventor with and assignee of E. J. TePas, Euclid, both in O., U. S. A.
373,125. **Tooth and Mouth Cleaning Implement.** W. H. Doyle, White Plains, N. Y., U. S. A.
373,134. **Truss.** A. C. Herzberg, Memphis, Tenn., U. S. A.

United Kingdom

475,065. **Electric Battery Lamps.** General Electric Co., Ltd., and F. C. Mayes.

475,241. **Parachutes.** Aerostatica Avorio, Soc. In Accomandita Semplice.
475,365. **Let-Off Motions.** Wool Industries Research Association and E. J. Poole.
475,451. **Shuttle Pegs.** L. Montigny and Soc. Anon. Anciens Etablissements Pipyn.
475,515. **Filters.** J. Cairns.
475,553. **Hand Grenades.** H. L. Sthyr and Sthyr & Partners, Ltd.
475,774. **Paper Wrappers.** L. Mellersh-Jackson. (R. H. Wilbur).
475,775. **Wrapping Machines.** Lauenstein & Co., Ges.
475,869. **Diaphragms.** Murphy Radio, Ltd., and A. K. Webb.
475,922. **Machine for Cutting and Embossing Paper Sheets.** S. Levin.
475.988. **Surgical Injection Appliances.** L. and Z. Lorenian.
476,068. **Carpet Looms.** Tomkinsons, Ltd., and G. H. Cartwright.
476,072. **Valve Cartons.** A. Astley.
476,078. **Sound Apparatus.** Electrical Research Products, Inc.
476,121. **Shower Baths.** H. E. Goss.
476,124. **Stuffing Box Substitutes.** Industria Specializzata Strumenti Aeronavigazione and U. Ciamberlini.
476,135. **Face Improver.** A. A. Coakley.
476,347. **Catamenial Appliances.** Sashena, Ltd., and J. McLaren.
476,443. **Battery Cages.** J. Mudd.
476,515. **Rotary Pumps.** Pulsometer Engineering Co., Ltd., and R. Warren.
476,564. **Device for Using Washing-Blue.** J. S. and M. S. Grassiani, (trading as B. Grassiani).
476,572. **Rubber Block for Floor Joists.** J. F. Bolton and A. Birch.
476,576. **Flooring Panels.** F. H. Ebner.
476,592. **Stenciling Apparatus.** O. Hommel Co.
476,595. **Toe Pads.** H. G. Wiberg.
476,615 and 476,622. **Concrete Piles.** Braithwaite & Co., Engineers, Ltd.
476,661. **Pipettes.** I. Szecsi.
476,686. **Refrigerating.** Hoover Holding Co., Ltd.
476,671. **Resilient Mountings.** F. W. Meredith and J. W. Barnes.
476,707. **Bottle Closures.** C. J. Parker.
476.742. **Oil-Blast Switches.** A. Reyrolle & Co., Ltd., and A. Allan.
476,885. **Device for Soldering and Brazing Pipes.** R. J. Minns.
476,895. **Polishing Pads.** E. Lowenstern.
476,922. **Facsimile Printing Telegraphs.** Standard Telephones & Cables, Ltd.
476,974. **Boots.** Del-Mac Shoe Process Corp.
476,978. **Footwear.** Atlas Ago Chemische Fabrik A.G.
476,985. **Batteries.** H. G. Doffin.
477,019. **Conductors.** Allgemeine Elektricitats-Ges.
477,023. **Thermometers.** A. J. E. Thill.
477,031. **Cables.** F. R. W. Strafford, and Belling & Lee, Ltd.
477,062. **Elastic Garment Bands.** A. Scheitlin.
477,068. **Collapsable Containers.** Tecalemit, Ltd.
477,090. **Umbrellas.** J. A. H. Siers.
477,103. **Swimming Pool Surrounds.** H. J. Haynes.
477,111. **Apparatus for Attaching Veneer.** W. Fischer-Suffert and F. Suffert-Burner, (trading as Fischer & Suffert).
477,127. **Gaiters.** L. Weisenfeld.
477.144. **Conveyers.** C. E. Jenner.
477,151. **Horseshoes.** G. Schori.
477,167. **Soles.** Sir H. W. Trickett, Ltd., and L. Richardson.
477,180. **Tractor Trailer Couplings.** A. G. Scammell, A. D. North, and Scammell Lorries, Ltd.
477,184. **Vehicle Hoods.** Mulliners, Ltd., and L. Antweiler.
477,205. **Percussive Drills.** Climax Rock Drill & Engineering Works, Ltd., (Wodack Electric Tool Corp.).
477,210. **Gaskets.** Dewey & Almy, Ltd. (Dewey & Almy Chemical Co.).
477,220. **Boot Insoles.** G. Green & Sons, Ltd., and W. E. Miles.
477,246. **Cables.** Condeles A.G.
477,281. **Transformers.** A. G. Haslam, F. R. W. Strafford, and Belling & Lee, Ltd.
477,290. **Handles.** H. M. Young.
477,308. **Loom Temples.** Llorens & Torra.
477,324. **Cables.** Siemens & Halske A.G.
477,340. **Folding Baby Carriages.** A. W. Bennett.
477,351. **Valves.** Soc. Nessi Freres Et Cie. and J. Massin.
477,422. **Printing Machines.** Crown Cork & Seal Co., Inc.
477,432. **Bowden Mechanism.** R. Bosch A.G.
477,437. **Sprayers.** R. Bosch A.G.
477,488. **Freezing Apparatus.** W. H. Allen.
477,576. **Fastenings.** J. Bengtsson.
477,606. **Resilient Mountings.** Getefo Ges. Fur Technischen Fortschritt.
477,610. **Respirators.** P. Nicholson.
477,662. **Compound Sheet Materials.** British Celanese, Ltd.
477,687. **Compound Fabrics.** R. Wheatley and Victoria Rubber Co., Ltd.
477,700. **Handbags.** Dunlop Rubber Co., Ltd., L. Harral, and S. J. Perry.
477,705 **Joints.** H. C. Lord.
477,750. **Medicament Applicator.** A. E. Massman.
477,793. **Arch Supports.** A. H. Stevens (H. May).
477,801. **Footwear.** L. Grover.
477,854. **Grinding Machine.** F. Deckel, (trading as F. Deckel, Prazisionsmechanik Und Maschinenbau).
477,905. **Conveyers.** Brightside Plating Co., Ltd., and J. Kronsbein.
477,909. **Cardboard Boxes.** No - Nail Cases Proprietary, Ltd., and A. M. Kamper.
477,934. **Bottle Closures.** J. Lehner.
477,974. **Massage Appliances.** H. Dreyer.
477,989. **Optical Sound Recording Apparatus.** B. Scruby and A. J. Roberts.
477,995. **Sole Molders.** British United Shoe Machinery Co.. Ltd., and W. N. Bray.
478,005. **Apparatus for Liquid Treatment of Yarn Packages.** V. R. Wilkinson-Allen.
478,078. **Overalls.** T. Hardy.
478,081. **Machine for Plucking Poultry.** A. G. Budd and H. Barton.
478,219. **Apparatus for Moistening or Conditioning Yarn.** G. T. Fuery (American Textile Engineering, Inc.).
478,400. **Plate Racks.** A. B. W. Taylor.

Germany

656,999. **Inner Tube.** H. Poppe, Kassel.
657,543. **Wheel with Rubber Spokes.** R. Wieland, Karlsruhe (Baden), and A. Futterer, Gaggenau.
657,569. **Cycle Saddle.** Deutsche Dunlop Gummi-Co., A.G., Hanau a.M.
657,612. **Skid-Chain.** R. Nier, Beierfeld (Erzgeb.).
657,850. **V-Belt.** A. Metzger, Pinneberg.
658,037. **Heel.** O. Brockman, Louisville, Ky., U. S. A. Represented by L. Schmetz, Aachen.
658,296. **Heel and Sole.** Gummistanzwerk Gustav Bartsch, Hamburg.

TRADE MARKS

United States

355,051. **Inco.** Rubber cement. Inter-Coastal Paint Corp., E. St. Louis, Ill.
355,066 **Scour Puss.** Scouring pads. F. J. Wuesthoff, Berkeley, Calif.
355,075. **Flexees Cool-Aire Twin Control.** Girdles, corsets, brassieres, etc. Artistic Foundations, Inc., New York, N. Y.
355,079. **Dupaco.** Suspenders and garters. Hutchins Pants Co., Cincinnati, O.
355,092. **Studio Girl.** Brassieres, corsets, etc. Neatform Co., Inc., New York, N. Y.
355,110. **Panel-Art.** Foundation garments, girdles, and brassieres. Formfit Co., Chicago, Ill.
355,126. **Marona.** Corsets. J. L. Hudson Co., Detroit, Mich.
355,149. **Paraweld.** Thermoplastic compositions. Menasha Products Co., Menasha, Wis.
355,161. **Midsolex.** Sheet material for middle soles. Latex Fiber Industries, Inc., Beaver Falls, N. Y.
355,220. **Foundette.** Girdles, brassieres, etc. Munsingwear, Inc., Minneapolis, Minn.
355,233. **Rainbow.** Prophylactic goods. Dean Rubber Mfg. Co., North Kansas City, Mo.
355,261. **Magnum.** Golf balls. Acushnet Process Co., New Bedford, Mass.
355,345. Representation of a can. Polish for articles coated with varnish, paint, lacquer, and enamel. General Tire & Rubber Co., Akron, O.
355,353. **A.B.C.** Prophylactic goods. E. F. Vaughn, doing business as Midwestern Drug Sundries, Topeka, Kan.
355,397. **Double Eagle.** Automobile robes. Goodyear Tire & Rubber Co., Akron, O.
355,398. **Resolute.** Automobile robes. Goodyear Tire & Rubber Co., Akron, O.
355,424. **Adagio.** Corsets, garter belts, brassieres, etc. Maiden Form Brassiere Co., Inc., New York, N. Y.
355,427. **HR Cord.** Treated tire cord and tire fabric. Bibb Mfg. Co., Macon, Ga.
355,486. **Better Bicking Copy Company.** Erasers and rubber bands. H. Bicking, doing business as Henry Bicking Co., New York, N. Y.
355,570. Representation of a female figure and the words: **"Mlle Suzette."** Corsets, brassieres, etc. Welfit Brassiere Corp., New York, N. Y.
355,579. Representation of a label containing the words: **"Strength without Strain. Styled by Paul White. Fashioned Today for Tomorrow."** Suspenders, garters, etc. I. R. Rothman, Brooklyn, N. Y.
355,623. Triple circle containing the letters: **"R-1."** Storage batteries. Goodyear Tire & Rubber Co., Akron, O.
355,670. **Armor Tread.** New and retreaded tires and retreads. Armor Tread Tire Corp., Curtis Bay, Baltimore, Md.
355.697. **Dual Balloon.** Tires. General Tire & Rubber Co., Akron, O.

Editor's Book Table

BOOK REVIEWS

"Rubber Producing Companies—1938." Compiled by the Mincing Lane Tea & Rubber Share Broker's Association, Ltd., Plantation House, Mincing Lane, London, E.C.3, England. Published by *The Financial Times,* 72 Coleman St., London, E.C.2. Boards, 605 pages, 5¼ by 8 inches. Indexed. Price 7s 6d.

Following the lines of previous editions, this annual reference work contains information, chiefly financial, concerning approximately 600 companies producing crude rubber. The data shown include: date of registration, list of directors and secretaries, financial structure, acreage, crops, profit and dividends, and other relevant information. Each company is described separately in alphabetical order throughout the book.

The preface points out that, although the amount of rubber wanted for use will be probably less in 1938 than in 1937, there lies a strong foundation of confidence for future demand, a confidence based on the fact that rubber is essential in a world where mechanization, speedy transport, and electrification are ever increasing and becoming more universal.

"Graphic Routes to Greater Profits." John W. Esterline. Published by The Esterline-Angus Co., Indianapolis, Ind. 1938. Fabrikoid, 8½ by 11 inches, 320 pages. 450 illustrations. Index. Price $3.

Based on the author's experience and that of some 300 industrial engineers, this book discusses the use of graphic instruments for increasing the efficiency and productive capacity of industry. The method of presentation is by case study; there are over 250 of these, each covering a distinct problem, giving the procedure followed, the graphic charts obtained, and the solution reached. The cases described cover representative uses of graphic instruments in different industries, with classification, in general, on the basis of the character of the problem, rather than on the basis of the industry in which the problem arose. The case studies throughout the book are numbered serially, and, as the index contains cross references, the reader can readily find the applications relating to a particular industry or to a given kind of equipment.

The introductory section comprises 30 pages, divided into three chapters: "The High Cost of Inefficiency;" "What Graphical Representation Means;" and "Classification of Industrial Problems." The remainder of the book is in five divisions: "The Problems of Power;" "The Problems of Machines;" "The Problems of Processes;" "The Problems of Men;" and "Research and Special Problems."

The case study on page 88 illustrates how the pyramiding of peak loads encountered in the operation of five rubber mills on the same line was avoided by graphically analyzing the power input. The study revealed that the power demand could be reduced considerably by charging the mills at five-minute intervals, thus staggering the peak loads of the five mills. On page 196 is shown the use of graphs for insuring correct voltage tests on rubber gloves. The use of graphic instruments for acceptance tests of a rubber mill is discussed on pages 271 and 272; reproduced charts of kilowatt and current input indicate the utility of these tests.

RUBBER BIBLIOGRAPHY

THE STATISTICS OF THE RUBBER INDUSTRY. *Bull. Rubber Growers' Assocn.,* Mar., 1938, pp. 122-28.

AUTOMATIC SHEETING BATTERIES. *Bull. Rubber Growers' Assocn.,* Mar., 1938, pp. 129-30.

ENDLESS RUBBER BELTS. C. Macbeth, *Bull. Rubber Growers' Assocn.,* Mar., 1938, pp. 133-37.

DUST COLLECTION PRACTICES AT GOODYEAR. D. E. Humphrey, *Rubber Age (N. Y.),* Apr., 1938, pp. 27-29.

CONTINENTAL'S CARBON BLACK PLANT. *Rubber Age (N. Y.),* Apr., 1938, pp. 30-32.

CHARLES GOODYEAR. P. W. Barker, *Rubber Age (N. Y.),* Apr., 1938, pp. 34-38. (To be continued.)

BEAD PROCESS GIVES CLEAN CARBON BLACK. C. R. Haynes, *Chem. Met. Eng.,* Apr., 1938, pp. 187-89.

PAINTS FROM CHLORINATED RUBBER. D. Brownlie, *Rubber Age (London),* Apr., 1938, pp. 32-33.

REVIEW OF THE MECHANICAL MIXING OF RUBBER. H. C. Young, *Rubber Age (London),* Apr., 1938, pp. 35-40.

LATEX IN THE RUBBER INDUSTRY. H. J. Stern, *Rubber Age (London),* Apr., 1938, pp. 43, 45-47. (To be continued.)

SECONDARY RUBBER YIELDING PLANTS OF THE CAUCASUS REGION AND OF CENTRAL ASIA. J. Legros, *India Rubber J.,* Mar. 5, 1938, pp. 9-10, 12-14; Mar. 12, pp. 6-7.

TIRES. G. S. Whitby, *India Rubber J.* Mar. 19, 1938, pp. 13-14.

SYNTHETIC RUBBER IN THE PRINTING INDUSTRY. R. B. Clarke, *India Rubber J.,* Mar. 26, 1938, pp. 7-10.

DESIGN OF RUBBER MIXINGS. III-IV. *India Rubber J.,* Mar. 19, 1938, p. 4; Mar. 26, p. 14.

MEASUREMENT OF THE WETTING SPEED OF PIGMENTS. E. Sauer and W. Gussmann, *Kolloid-Z.,* Mar., 1938, pp. 253-69.

DETERMINATION OF SWELLING. J. Gleizes, *Rev. gén. caoutchouc,* Jan., 1938, pp. 3-11. (Conclusion.)

EFFECT OF VULCANIZATION ON OXIDIZABILITY IN RELATION WITH AGING. C. Dufraisse and A. Etienne, *Rev. gén. caoutchouc,* Jan., 1938, pp. 12-24.

COMPRESSION TESTS ON VULCANIZED RUBBER. R. Ariano, *Gomma,* Jan.-Feb., 1938, pp. 1-6.

REQUIREMENTS OF PNEUMATIC TIRES FOR AIRCRAFT. A. Silvestri, *Gomma,* Jan.-Feb. 1938, pp. 7-10.

FORMATION OF FACTICE-LIKE MASSES FROM FATTY ACIDS CONTAINING SULPHUR. J. Baltes, *Kautschuk,* Mar., 1938, pp. 45-48.

EXPERIMENT IN THE RATIONAL DETERMINATION OF THE CAMBERING OF CALENDER ROLLS. G. A. Ardichvili, *Kautschuk,* Mar., 1938, pp. 41-45. (Conclusion.)

ALKYLENE SULPHIDE CARBOXYLIC ACIDS AS STRUCTURAL UNITS FOR A FACTICE. R. Salchow, *Kautschuk,* 14, 12-14 (1938).

SWELLING OF RUBBER IN MIXED MEDIA. N. Jermolenko and R. Zirlina, *Kolloid. Shurn.,* 3, 355-65 (1937).

RUBBER-LINING OF TANKS. H. F. Reves, *Metal Cleaning Finishing,* 9, 788-90 (1937).

THE ULTRACENTRIFUGE AND ITS FIELD OF RESEARCH. T. Svedberg, *Ind. Eng. Chem. (Anal. Ed.),* Mar. 15, 1938, pp. 113-27.

MILESTONES IN RUBBER. *Can. Chem. Proc. Ind.,* Mar., 1938, p. 80.

SORPTION OF WATER BY RUBBER. R. L. Taylor and A. R. Kemp, *Ind. Eng. Chem.,* Apr., 1938, pp. 409-15.

MIXED LINEAR CONDENSATION POLYMERS. X-Ray Investigation. C. S. Fuller, *Ind. Eng. Chem.,* Apr., 1938, pp. 472-77.

ANTIOXIDANTS AND PROBLEMS CONNECTED WITH THEIR USE IN THE FACTORY. M. Jones, *Trans. Inst. Rubber Ind.,* Dec., 1937, pp. 281-97.

DYE AND LAKE PIGMENTS FOR RUBBER. H. Jones, *Trans. Inst. Rubber Ind.,* Dec., 1937, pp. 298-316.

RUBBER AND ASBESTOS. G. F. Payne, *Trans. Inst. Rubber Ind.,* Dec., 1937, pp. 317-43.

NEW APPLICATIONS OF GLYCERINE. G. Leffingwell and M. A. Lesser, *Chem. Ind.,* Apr., 1938, pp. 395-98.

"The Acid Test of Better Piping." Bulletin No. 902. The United States Stoneware Co., Akron, O. 17 pages. Illustrated. This manual of facts is about "Flexlock" rubber joints. Designed by The B. F. Goodrich Co. in cooperation with The U.S. Stoneware Co., "Flexlock" joints are molded rubber rings which serve as corrosion-proof couplings for "U.S. Stoneware" piping.

NEW PUBLICATIONS

"Equipment News." Farrel-Birmingham Co., Inc., Ansonia, Conn. Illustrated. 4 pages. This first issue of an expected bi-monthly publication for distribution to consuming industries discusses modern trends in machinery design as exemplified by streamlined, all-enclosed hydraulic presses and "Roller Feed" tubers and strainers. In connection with the hot breakdown of rubber, it is claimed that the Gordon plasticator produces a more uniform product at lower costs and that one 20-inch plasticator will equal nine to ten 84-inch mills. The concluding article presents data on relative efficiency of major industries based on the number of men employed per $100,000 of conversion values.

"News about du Pont Rubber Chemicals." E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. A news letter of April 15 states that, owing to unforeseen delays, the schedule for opening the new Neoprene plant has fallen behind slightly, but it is expected that production of Neoprene will begin no later than June 1. With the news letter was a third report in the "Limitations of Rubber" series. In it N. L. Catton discusses the influence of petroleum on rubber and Neoprene and gives recommendations for oil resistant rubber and Neoprene stocks.

A news letter of March 22 stated that the new Noeprene plant is expected to produce not less than 250,000 pounds per month. A report with this letter on "Tire Compounding," by M. F. Torrence, discusses tire compounding practice for tread, sidewall, carcass, and bead insulation stocks with recommended formulas and physical test data, particularly as applying to varying tire qualities.

"Quit Your Skidding." The B. F. Goodrich Co., Akron, O. 32 pages. A manual of instructions to motorists on how to avoid or recover from a skid, this booklet was issued in connection with the recent introduction of the company's newly designed anti-skid tire and tells of this development.

"Plastics." S. Ranganathan and H. K. Sen. Published by Institution of Chemists (India), Calcutta, India. 183 pages. Illustrated. This comprehensive treatise presents an informative discussion on the production, properties, and uses of those natural and synthetic resins which are the basic materials of the plastics industry. The materials discussed include: natural products—rubber, bitumens, shellac, and casein; synthetic products—phenol-formaldehyde, cumarone and indene, cellulose derivatives, urea-formaldehyde, alkyd, acrylic, vinyl, and styrol resins. Sections of the booklet are devoted to molding powders, molds, presses, and molding operation.

"Neville Coal-Tar Solvents." The Neville Co., Pittsburgh, Pa. 32 pages. This booklet, revised in March, 1938, contains factual data on Neville coal-tar hydrocarbon solvents. These solvents are divided into two general groups: 1. refined, including benzols, toluols, xylols, and hi-flash naphthas; 2. crude, including crude heavy solvent, high-boiling crudes, and heavy naphthas. To aid selection of the proper solvent for a given purpose, the booklet contains reference tables on solvent specifications, solubility, miscibility, relative evaporations, and comparative solvency.

"Berstorff Rubber Machinery." Hermann Berstorff Maschinenbau-Anstalt, G.m.b.H., Hannover, Germany. 129 pages. This illustrated catalog covers the firm's complete line of equipment for rubber factories. This includes calenders, mills (washing, mixing, and refining), tubing machines, hydraulic presses, wrapping machines, cutting machines, and vulcanizing heaters; also, complete installations for the manufacture of impregnated fabrics and cut sheets. Information on the possible applications of each type of machine, as well as details about its construction, is printed in English, French, German, and Spanish.

"Differences in the Earnings of Women and Men." Bulletin No. 152, Women's Bureau, United States Department of Labor. 57 pages. Illustrated. This bulletin gives a study of the differences in men's and women's average wages, compared as to industry, type of occupation, and method of pay. Copies of this pamphlet are available for 10¢ from the Superintendent of Documents, Washington, D. C.

"Abbé-Lenart Mixers." Bulletin 43. Abbé Engineering Co., 50 Church St., New York, N. Y. 8 pages. Illustrated. This bulletin contains specifications and other information on the company's Abbé-Lenart mixers, which have a variety of applications, including paints, lacquers, colors, chemicals, etc.

"Linear Mechanical Packings." Linear Packing & Rubber Co., Inc., 6400 State St., Philadelphia, Pa. 112 pages. This handsomely bound manual and data book on mechanical packings contains detailed and illustrated information on the composition, construction, and application of the following types of Linear packing: asbestos, flax, duck and rubber, semi-metallic, molded, plastic, combination, sheet, railroad, and oil-field. A detailed chart of service recommendations is given which provides a quick means for determining the proper type of packing to be used under a given set of conditions. The book is concluded with relevant technical data and a type and style number index.

"Aerosol Wetting Agents." American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y. 32 pages. This booklet discusses the properties and uses of Aerosol wetting agents, new synthetic chemicals with unusual wetting, penetrating, emulsifying, and dispersing properties. The most powerful of these agents is Aerosol OT, an ester of a sulphonated bi-carboxylic acid. Aerosols MA and AY are chemically similar to the OT type; while Aerosol OS is the sodium salt of an alkyl naphthalene sulphonic acid. The properties discussed include: solubility, effect on surface tension, wetting power, pH value of aqueous solutions, emulsifying power, detergent effect, and stability in acids and alkalies. Specific recommendations or formulas are given for the use of these wetting agents with: antiseptics, cosmetics, dentifrices, detergents, emulsions, inks, preparations for treating metals, paints, varnishes, paper, and shampoos. Several graphs illustrate the booklet.

"The Modern Gasoline Pump Hose." Thiokol Corp., Trenton, N. J. 8 pages. This booklet points out two important changes in modern gasoline pump hose design: protection of the cotton jacket with a tough rubber compound; elimination of metal from the construction by using an inner lining of oil-proof synthetic rubber. The advantages of hose made with "Thiokol" rubber are cited, and twenty questions with answers, relating to the use of this type of hose, are included.

New Jersey

(*Continued from page* 68)

ried out, will be made on June 20, 1938, subject to the checking of Whitall-Tatum's books and assets and the approval by Armstrong stockholders of the company's plan for financing the purchase. Purchase of Whitall-Tatum will complement the activities of the Closure Division of the Armstrong Cork Co. Pioneer manufacturer of cork bottle stoppers, Armstrong during recent years has added to its line of products crown caps, metal caps, and molded plastic closures for bottles and jars. The New Jersey company manufactures an extensive line of glass containers, graduates, glass insulators, glass specialties, and also rubber sundries for the retail drug trade. Hence, with the purchase of the Whitall-Tatum Co., Armstrong's Closure Division will be able to offer its customers a complete glass packaging service. When the purchase becomes effective, Armstrong will operate the New Jersey plants as going concerns, taking over the company's trained personnel. Whitall-Tatum employes number upwards of 700.

New York Group

(*Continued from page* 56)

chemical data, according to the speaker, should ultimately lead to a better understanding of this important question.

William Welch, president of the Midwest Rubber Reclaiming Co., East St. Louis, Ill., presented the motion and sound picture, "Rubber Reborn," which strikingly depicts the entire process of producing reclaimed rubber, a material used in over 30,000 different rubber products and which is the most important domestic source of rubber, according to Mr. Welch. Reclaim production is divided into three general processes: scrap preparation, digestion, and milling.

Dinner favors, in the form of key chains with good-luck charms, were distributed through the courtesy of The Bead Chain Mfg. Co., Bridgeport, Conn.

Akron Group

WITH an attendance of 150, the spring meeting of the Akron Group, Rubber Division, A.C.S., was held on April 22. Officers for the coming year, as elected at the meeting, follow: chairman, A. E. Warner, C. P. Hall Co.; vice chairman, R. La Porte, Seiberling Rubber Co.; secretary-treasurer, H. V. Powers, Goodyear Tire & Rubber Co.

The speaker for the evening was W. H. Bradshaw, director of the Rayon Division, E. I. du Pont de Nemours & Co., Inc., who gave a very interesting talk on the progress of rayon. Chief manifestations of the growth of this industry, according to the speaker, are the tremendous increase in the volume sold and the decrease in price. Mr. Bradshaw pointed out that improvements in rayon materials have served to bring them from basement counters to exclusive Fifth Avenue stores. Of particular interest to the rubber industry was his discussion on tire rayon which, he predicted, would be of marked signifiance in the near future.

A.S.T.M. Annual Meeting

The 1938 annual meeting of the American Society for Testing Materials will be held at Chalfonte-Haddon Hall, Atlantic City, N. J., June 27 to July 1, inclusive. A well-diversified program is being developed for the meeting which will feature a symposium on impact testing. This symposium will be an effort to present an integrated series of papers on the subject, covering both the theoretical and practical aspects of impact testing. In line with the society's policy of holding exhibits only at two-year intervals, there will be no exhibit of testing apparatus this year.

Financial

(*Continued from page* 60)

Hewitt Rubber Corp., Buffalo, N. Y., and subsidiaries. March quarter: net earnings after all charges and reserves, including normal federal income and undistributed profits taxes, $10,691, equal to 6¢ a share on outstanding capital stock, compared with net earnings of $103,553, or 63¢ a share, last year. The company has no funded debt or preferred stock.

British United Shoe Machinery Co., Ltd., Leicester, England. For 1937: net income, £581,964, against £568,183 earned in 1936.

Dunlop Rubber Co., Ltd., London, England. For 1937: profit before taxes, £1,591,017, against £1,502,707 in 1936; after transfer of £495,815 to taxation reserve, net profit for 1937 was £1,095,202 before transfer of £250,000 to reserve for contingencies, as compared with net profit in 1936 of £1,107,807 before transfer of £150,000 to reserve for contingencies and £100,000 to general reserve.

World Net Imports of Crude Rubber

Year	U.S.A.	U.K.†	Australia	Belgium	Canada	Czechoslovakia	France	Germany	Italy	Japan	Russia	Rest of the World	Total
1935	455,800	175,100	10,000	7,600	26,900	11,200	52,300	62,900	25,400	57,600	37,600	58,300	934,400
1936	475,300	62,700	14,400	9,600	27,900	8,800	56,800	71,800	16,000	61,700	31,000	64,600	931,100
1937	592,528	137,351	19,257	14,969	36,087	13,063	59,959	98,170	23,980	62,205	27,404*	67,745	1,107,798
1937													
Jan.	42,665	3,855	590	854	1,632	567	4,701	7,041	1,762	8,298	2,633	5,959	76,460
Feb.	44,408	6,081	331	1,363	1,271	837	5,276	7,911	1,477	6,605	3,048	5,068	77,373
Mar.	39,897	7,197	1,293	1,641	2,612	601	5,130	7,668	1,999	6,914	3,598	6,172	77,868
Apr.	42,076	9,871	1,058	1,069	1,343	1,445	5,302	8,664	1,589	5,808	1,532	5,843	79,537
May	48,517	8,488	1,287	2,113	4,187	925	5,619	6,706	2,745	8,597	1,886	6,244	94,926
June	48,983	10,437	2,258	1,630	3,790	1,150	6,022	6,469	1,745	7,608	3,940	6,127	94,879
July	43,028	13,854	1,959	851	1,946	754	4,315	7,860	2,662	4,869	2,150	5,865	86,887
Aug.	49,496	18,483	2,114	1,013	3,506	1,692	4,499	8,752	2,447	4,411	1,226	5,553	100,466
Sept.	56,698	16,654	3,104	1,258	2,396	1,369	4,830	10,595	1,941	3,671	1,391	5,578	108,502
Oct.	52,938	15,091	2,510	966	5,998	988	4,286	8,076	939	2,060	2,000*	5,457	98,116
Nov.	54,146	14,794	1,944	925	4,787	845	4,231	8,848	2,790	1,368	2,000*	4,756	99,518
Dec.	69,676	12,546	809	1,286	2,619	1,890	5,748	9,580	1,884	1,996	2,000*	5,123	113,266
1938													
Jan.	45,596	17,811	617	1,258	1,789	1,102	4,780	6,314	1,809	4,935	2,000*	5,201	90,859

*Estimate. †U.K. figures show gross imports, not net imports. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Shipments of Crude Rubber from Producing Countries

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Siam	French Indo-China	Total	Philippines and Oceania	Africa	South America	Mexican Guayule	Grand Total
1935	417,000	282,900	54,300	9,100	4,900	8,900	19,300	28,300	28,700	853,400	1,500*	5,000	12,200	500	872,600
1936	353,700	309,600	49,700	8,600	5,800	8,200	21,000	34,600	40,800	832,000	1,600*	6,100	14,700	1,200	855,600
1937	469,960	431,646	70,359	9,777	7,232	13,213	25,922	35,551	43,374	1,107,034	1,617	7,731	16,008	2,692	1,135,082
1937															
Jan.	24.746	27.038	4,514	487	579	1,234	4,015	3,849	2.825	69.287	80	635	1,286	160	71,448
Feb.	24.138	26.711	5,603	1,033	843	790	2,015	3,554	3.078	67,765	180	537	1,789	206	70,477
Mar.	40.138	40.710	7,049	885	1,149	1,239	1,425	3,873	3,173	99,641	181	472	1,792	136	102,222
Apr.	41.696	32.903	3,419	627	559	783	2,960	1,899	2.095	86.941	124	574	1,546	190	89.375
May	33.929	38.360	4,607	445	562	778	742	2,238	2,862	84,523	98	676	1,057	182	86,536
June	31.376	46.753	5,149	662	430	813	1,890	2.933	3,673	93,679	117	621	915	145	95,477
July	45.900	43.617	6.279	703	263	1,414	2,543	3.175	5.563	109.457	111	872	940	371	111,751
Aug.	43.284	40.438	7.308	471	134	1,189	1.624	2.999	2,277	99,724	187	726	1,314	335	102,286
Sept.	48.515	38.306	5,804	944	148	969	2,659	3,173	4,131	104.649	140	668	1,060	329	106,846
Oct.	47.586	34.416	6,701	994	254	1,505	523	2,352	3,753	98.084	99	708	1,533	247	100,671
Nov.	45.598	29.107	4,394	1,228	907	1,327	2,517	2.549	4.556	92.183	159	642	983	251	94,218
Dec.	43.054	33.287	9.532	1.298	1,404	1,172	3,009	2,957	5,388	101.101	141	600*	1,793	140	103,775
1938															
Jan.	30.998	26.414	5,222	841	538	1,307	3,485	2.897	6.088	77.790	138	850*	938	538	80,254
Feb.	37,166	27,250	5,193	653	770	918	8	3,266	3,070	78,294	150*	750*	1,341	250*	80,785

*Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Market Reviews

CRUDE RUBBER

TABULATED WEEK-END CLOSING PRICES

Futures	Feb. 26	Mar. 26	Apr. 2	Apr. 9	Apr. 16	Apr. 23
Mar.	14.78	12.82	.....	.....	.....	.....
Apr.	14.86	12.88	11.36	11.88	12.48	12.59
May	.....	.....	11.40	11.90	12.52	12.63
July	15.09	13.10	11.58	12.18	12.70	12.79
Sept.	15.22	13.25	11.68	12.30	12.83	12.95
Dec.	15.42	13.45	11.86	12.48	13.03	13.16
Feb.	.....	13.57	11.99	12.60	13.16	13.27
Mar.	.....	.....	12.06	12.66	13.22	13.33
Volume per week (tons) ..	18,290	16,850	34,250	20,420	10,070	16,390

New York Quotations

New York outside market rubber quotations in cents per pound

	Apr. 27, 1937	Mar. 28, 1938	Apr. 27, 1938
Plantations			
Rubber latex...*gal.*	79/80	49/50	46/47
Paras			
Upriver fine.......	22¾	12¼	11¼
Upriver fine......	*28	*15¾	15¼
Upriver coarse ..	14½	8¼	8
Upriver coarse ...	*22¾	*13½	*13
Islands fine	22	12	10½
Islands fine	*27¾	*15¼	*14½
Acre, Bolivian fine	23	12½	11½
Acre, Bolivian fine	*28½	*16	*15½
Beni, Bolivian fine	23½	13¼	12
Madeira fine	22¾	12¼	11¼
Caucho			
Upper ball.......	14	8½	8
Upper ball........	*22½	*13½	*13
Lower ball.......	13¾	8	7½
Pontianak			
Pressed block.....	11/30	13/30	12/28
Guayule			
Duro, washed and dried	16	11¼	11½
Ampar	17½	12¼	12
Africans			
Rio Nuñez	21	13½	13¼
Black Kassai	21	13½	13¼
Prime Niger flake.	28	23	23
Gutta Percha			
Gutta Siak	11	13½	13
Gutta Soh.......	15	17	17
Red Macassar	1.00/1.05	1.20/2.00	1.00/1.25
Balata			
Block, Ciudad Bolivar	32	29	30
Manaos block	28	27	27
Surinam sheets ..	35	32	38
Amber	38	36	39

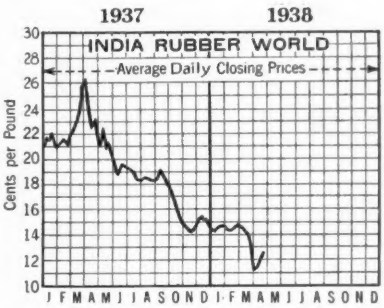
*Washed and dried crepe. Shipments from Brazil.

Commodity Exchange

THE Commodity Exchange table published here shows prices of representative future contracts on the New York market during the past two months.

On March 26, July futures closed at 13.10¢ per pound. At the meeting of the International Rubber Regulation Committee on March 29 no action was taken to reduce quotas further for the second quarter. Following this meeting and the failure of a prominent Singapore rubber house on March 31, July futures dropped sharply to close at 10.45¢ per pound on March 31, the lowest level since the current restriction plan was put into effect in June, 1934. Under the influence of better buying interest and higher consumption figures for March, the price recovered, gradually rising during the month to close at 11.34¢ per pound on April 30. During the past four weeks the maximum variation in prices for delivery during the next year was 0.78¢ per pound. The continued maintenance of this wide spread in prices indicates that the trade still feels that more favorable prices will prevail later in the year. The volume of trading during the week ending April 2 was 34,250 tons, the highest since May, 1937. Trading during the remainder of the month was only moderate.

Consumption of crude rubber in the United States for the first quarter of 1938 was 46.6% below the total for the first quarter of 1937. This rather drastic decline in the use of crude rubber in the United States is not generally reflected elsewhere, with the result that the absorption in other countries has been only 7.4% less this year than in the same period of 1937. Countries showing sizeable increases were: United Kingdom, Czechoslovakia, Italy, Sweden, and Poland. Absorption in Japan and Germany has decreased. The world as a whole absorbed crude rubber during the first quarter of this year at the rate of 67,414 tons per month as compared with 94,876 tons per month for the same period of 1937, a decrease of 27,462 tons, or 28.9% on a monthly average.



New York Outside Market—Spot Ribbed Smoked Sheets

March tire statistics, indicating an increase in production and a slight decrease in inventories, had little effect on rubber prices.

On the following page are reported United States statistics on imports, consumption, stocks, and crude rubber afloat during March.

New York Outside Market

With factory buying renewed somewhat on a recovering market, activity in the outside market was at an improved rate during April. There was also a fair amount of shipment business done. After closing at 10¼¢ per pound on March 31, the low for the month, the price of No. 1 ribbed smoked sheets rose gradually during April to close at 11.25¢ per pound on April 30.

The week-end closing prices on No. 1 ribbed smoked sheets follow: April 2, 11 5/16¢; April 9, 11 15/16¢; April 16, 12½¢; April 23, 12⅝¢; and April 30, 11¼¢.

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	March, 1938				April, 1938																			
	28	29	30	31	1	2	4	5	6	7	8	9	11	12	13	14	15*	16*	18	19	20	21	22	23
No. 1 Ribbed Smoked Sheet	12¾	11⅜	10 11/16	10¼	10⅞	11 5/16	11⅛	11	11⅛	11¼	11⅞	11 15/16	11⅝	11 15/16	12¼	12½	..	..	12¾	12 7/16	12 9/16	12 7/16	12¾	12⅝
No. 2 Ribbed Smoked Sheet	12⅜	10 15/16	10¼	9⅞	10½	10 15/16	10¾	10⅝	10¾	10⅞	11½	11½	11¼	11 9/16	11⅞	12⅛	..	..	12⅜	12 1/16	11 15/16	12 1/16	12⅜	12¼
No. 3 Ribbed Smoked Sheet	11⅞	10¼	9¾	9⅜	10	10 7/16	10¼	10⅛	10¼	10⅜	11 1/16	11 1/16	10 13/16	11 1/16	11⅜	11⅝	..	..	11⅞	11 9/16	11½	11⅝	11⅞	11¾
No. 4 Ribbed Smoked Sheet	11¾	10⅛	9⅝	9¼	9⅞	10¼	10⅛	9 15/16	10 1/16	10¼	10 15/16	10 15/16	10 9/16	10 15/16	11¼	11½	..	..	11¾	11 7/16	11 5/16	11 7/16	11 13/16	11 9/16
No. 1 Thin Latex Crepe...	13 15/16	12¼	11 9/16	11⅛	11⅞	12 5/16	12	12⅛	12⅜	12 7/16	13⅛	13¼	12 15/16	13 9/16	13½	13⅝	..	..	13⅞	13½	13 7/16	13½	13¾	13⅝
No. 1 Thick Latex Crepe..	13 15/16	12¼	11 9/16	11¼	12⅛	12 9/16	12⅜	12⅜	12⅝	12¾	13⅜	13¾	13¾	14¼	14 9/16	14⅝	..	..	14¾	14 9/16	14⅛	14¼	14⅜	14¼
No. 1 Brown Crepe.......	11⅞	10½	9 13/16	9½	10⅛	10 9/16	10⅜	10 5/16	10 5/16	10 7/16	11⅛	11⅛	10 13/16	11 9/16	11½	11¾	..	..	11 15/16	11⅝	11 9/16	11 11/16	12	11⅞
No. 2 Brown Crepe.......	11¾	10⅜	9 11/16	9 5/16	9 15/16	10⅜	10⅛	10 1/16	10 5/16	10 5/16	10 15/16	11	10 11/16	11 1/16	11⅜	11⅝	..	..	11 13/16	11½	11 7/16	11 9/16	11⅞	11¾
No. 2 Amber............	11⅞	10½	9 13/16	9½	10⅛	10 9/16	10⅜	10 9/16	10 5/16	10 7/16	11⅛	11⅛	10 13/16	11 9/16	11½	11¾	..	..	11 15/16	11⅝	11 9/16	11 11/16	12	11⅞
No. 3 Amber............	11¾	10⅜	9 11/16	9 5/16	9 15/16	10⅜	10⅛	10 1/16	10 5/16	10 5/16	10 15/16	11	10 11/16	11 1/16	11⅜	11⅝	..	..	11 13/16	11½	11 7/16	11 9/16	11⅞	11¾
No. 4 Amber............	11⅜	9⅞	9 5/16	8⅞	9½	9 15/16	9¾	9⅝	9¾	9 15/16	10 9/16	10⅝	10¼	10 9/16	10 15/16	11¼	..	..	11 7/16	11⅜	11	11 5/16	11½	11⅜
Rolled Brown...........	9⅝	8⅜	7 11/16	7¼	7⅞	8 5/16	8⅛	8	8¼	8⅜	9	9 1/16	8¾	9 1/16	9½	9⅝	..	..	9⅞	9⅝	9½	9 11/16	10	9⅞

*Closed.

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Imports* Tons	U. S. Consumption¶ Tons	U. S. Stocks Mfgrs. Importers, Dealers, Etc.† Tons	U. S. Stocks Afloat† Tons	U. K.— Public Warehouses, London, Liverpool†‡ Tons	Singapore and Penang Dealers and Port Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1936	490,858	575,000	223,000	56,567	78,462	26,969	855,600	1,044,218	538,028
1937	584,851	542,947	256,618	63,099	57,785	44,792	1,135,082	1,090,183	631,189
1937									
January ...	32,820	50,818	204,201	55,096	71,062	36,365	71,448	**92,874	521,267
February ..	43,289	51.887	195,080	53,538	63,760	42,132	70,477	92,975	510,782
March	52,039	54,064	191,928	56,994	52,077	42,485	102,222	104,276	521,731
April	35,850	51,797	174,934	72,530	48,748	38,812	89,375	95,232	497,218
May	50,840	51,733	172,985	58,542	46,628	34,234	86,536	103,265	488,898
June	48,956	51,798	169,646	57,215	43,427	45,085	95,477	103,872	518,949
July	39,108	43,650	164,445	75,779	42,175	44,759	111,751	87,460	519,621
August ...	48,785	41,456	171,052	80,439	45,211	47,873	102,286	87,459	533,874
September..	56,049	43,893	182,556	83,288	49,807	49,438	106,846	89,626	545,881
October ...	52,508	38,707	195,685	80,653	51,932	41,948	100,671	83,611	551,478
November..	56,302	33,984	217,586	81,302	54,857	38,778	94,218	77,549	570,801
December...	68,305	29,160	256,618	63,099	57,785	44,792	103,775	71,984	631,189
1938									
January ...	42,135	29,429	269,078	57,356	62,108	48,494	80.254	69,107	a629,045
February ..	43,930	23,868	288,883	47,459	71,516	46,241	80,785	62,835	
March	35,967	30,487	294,024	41,882	......	......	......	......	......

* Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos regulated areas, and afloat. ¶Corrected to 100% from estimate of reported coverage. **Not including additional absorption from U.K. manufacturers' stocks for any month during 1937. The figure will be included in yearly total. a Japan stocks not included.

CRUDE rubber consumption by United States manufacturers during March, 1938, is estimated at 30,487 long tons, against 23,868 long tons during February, 1938, an increase of 27.7% over February, but 43.6% under the 54,064 long tons consumed in March, 1937, according to R.M.A. statistics.

Gross imports of crude rubber for March are reported to be 35,967 long tons, 18.1% under the February figure of 43,930 long tons and 30.9% under the 52,039 long tons of March, 1937.

Total domestic stocks of crude rubber on hand March 31 are estimated at 294,024 long tons, compared with February 28 stocks of 288,883 long tons and 191,928 long tons on March 31, 1937.

Crude rubber afloat to United States ports as of March 31 is estimated at 41,882 long tons, contrasted with 47,459 long tons afloat on February 28 and 56,994 long tons on March 31, 1937.

London and Liverpool Stocks

Week Ended	London (Tons)	Liverpool (Tons)
April 2	50,389	26,199
April 9	51,143	26,123
April 16	51,999	26,746
April 23..............	53,498	27,445
April 30..............	54,292	28,352

RECLAIMED RUBBER

ACCORDING to R.M.A. figures, March reclaimed rubber consumption is estimated at 8,573 long tons, an increase of 25% over February; production, 6,669 long tons; and stocks on hand March 31, 24,401 long tons. The demand for reclaim improved during April, and reclaimers expect a further increase in activity in May.

The market remains steady, with quotations on all grades remaining at levels established three months ago.

New York Quotations

April 22, 1938

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	6¼/ 6½
Acid	1.18-1.22	7¼/ 7½
Shoe		
Standard	1.56-1.60	7 / 7¼
Tubes		
No. 1 Floating.........	1.00	14 /14¼
Compounded	1.10-1.12	9 / 9¼
Red Tube	1.15-1.30	9 / 9½
Miscellaneous		
Mechanical Blends ...	1.25-1.50	4¾/ 5
White	1.35-1.50	13 /13¼

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Trafalgar Sq., London, W.C.2, England, gives the following figures for March, 1938:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

To	Sheet and Crepe Rubber Tons	Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons
United Kingdom	9,102	332
United States	17,136	349
Continent of Europe ..	11,871	581
British possessions	3,621	60
Japan	5,291	55
Other countries	799	...
Totals	47,820	1,377

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber (Dry Weight) Tons
Sumatra	6,623	889
Dutch Borneo	2,249	21
Java and other Dutch Islands	335	6
Sarawak	1,346	1
British Borneo	285	21
Burma	433	8
Siam	2,307	616
French Indo-China	427	132
Other countries	112	2
Totals	14,117	1,696

RUBBER SCRAP

THE scrap market continued quiet during April, with no indications of a marked change in the near future. All quotations remain at last month's levels.

CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)
April 25, 1938

		Prices
Boots and Shoes		
Boots and shoes, black.....	lb.	$0.01 /$0.01¼
Colored	lb.	.00¾/ .00⅞
Untrimmed arctics	lb.	.00¾/ .00⅞
Inner Tubes		
No. 1, floating	lb.	.09½/ .10
No. 2, compound...........	lb.	.03⅞
Red	lb.	.03¾/ .03⅞
Mixed tubes	lb.	.03⅜/ .03½
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	ton	11.50 /12.00
Beadless	ton	15.00 /15.50
Auto tire carcass.......	ton	17.00 /18.00
Black auto peelings.....	ton	20.00 /21.00
Solid		
Clean mixed truck......	ton	26.00 /27.00
Light gravity	ton	39.00 /40.00
Mechanicals		
Mixed black scrap........	ton	18.00 /20.00
Hose, air brake	ton	17.00 /18.00
Garden, rubber covered.	ton	11.00 /12.00
Steam and water, soft..	ton	11.00 /12.00
No. 1 red.................	lb.	.02¾/ .03
No. 2 red.................	lb.	.02½/ .02¾
White druggists' sundries..	lb.	.03½/ .03¾
Mechanical	lb.	.01½/ .01¾
Hard Rubber		
No. 1 hard rubber.........	lb.	.12 / .12½

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption†	Consumption % to Crude	U. S. Stocks*	Exports
1936	150,571	141,486	24.6	19,000	7,085
1937	178,776	157,990	29.1	26,260	13,293
1938					
Jan.	8,467	6,673	22.7	27,179	658
Feb.	6,012	6,867	28.8	26,431	470
Mar.	6,669	8,573	28.1	24,401	....

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage.
Compiled by The Rubber Manufacturers Association, Inc.

COMPOUNDING INGREDIENTS

GENERAL demand has moderately improved during the past month. The upturn, however, has been below the normal expectation for the season, and volume is considerably under that of a year ago. Although business is expected to improve further, there are no present indications that buying will extend to last year's rate. Prices in general remain steady at levels quoted a month ago.

CARBON BLACK. There has been no change in the base price (f.o.b. Texas), but because of higher freight rates the scheduled price for rail delivery in Zone A went into effect on April 1. Price increases for delivery in other rail zones went into effect on April 4. The new schedule (key centers are in parenthesis) for standard grade blacks in car lots is as follows: Zone A (Gulf Ports), 2.75¢ per pound; Zone B (Denver, Colo.), 3.1¢; Zone C (Los Angeles, Calif.), 3.19¢ (50,000-pound cars) and 3.35¢ (30,000-pound cars); Zone D (Chicago, Ill.), 3.25¢; Zone E (Akron, O.), 3.41¢; Zone F (New York, N. Y.), 3.75¢; and Zone G, 2.90¢ (f.o.b. New Orleans), 3¢, (f.o.b. Mexican border). Prior to the increase in freight rates there was a short buying spurt. This did not hold, and business was quiet during the latter part of the month.

FACTICE OR RUBBER SUBSTITUTE. The demand for rubber substitute has improved slightly, and prices remain at former levels.

LITHARGE. The demand has shown steady, although mild improvement throughout the past month, with movement into consumption at a fair rate during the latter part of the month. No change in prices occurred.

LITHOPONE. Although there was definite improvement in demand during April, business was below what might be expected at this season of the year. Prices continue unchanged. February exports totaled 307,078 pounds, of which 204,375 pounds went to Canada, according to the Department of Commerce.

RUBBER CHEMICALS. Demand during April was light and at about the same rate as in March. There have been no changes of any consequence in prices.

RUBBER SOLVENTS. Buying activity was modest during the past month. Prices are steady with the tankcar market in the Midcontinent refinery district continuing at 6⅜¢ per gallon.

STEARIC ACID. Raw material was somewhat easier, but there has not been sufficient change to bring about a revision of the price of stearic acid. There was a fair movement of acid into consuming channels. However purchasers were still not inclined to buy in advance of immediate requirements.

TITANIUM PIGMENTS. Although business during April improved somewhat over March, the general level of demand is substantially below that of a year ago and somewhat below that of 1936. Business with the rubber trade has been fairly quiet. The price situation has not changed.

ZINC OXIDE. Sales during the past month were better than in previous months. The rubber industry and other regular users have been buying in moderate amounts. A drop in the price of zinc metal did not affect the position of the oxides, and previous price schedules are in force.

New York Quotations

April 25, 1938

Prices Not Reported Will Be Supplied on Application

Abrasives			
Pumicestone, powdered	*lb.*	$0.03	/$0.035
Rottenstone, domestic	*lb.*	.03	/ .035
Silica, 15	*ton*	38.00	
Accelerators, Inorganic			
Lime, hydrated, l.c.l., New York	*ton*	20.00	
Litharge (commercial)	*lb.*	.065	/ .0725
Accelerators, Organic			
A-1	*lb.*	.26	
A-5-10	*lb.*	.35	/ .40
A-7	*lb.*	.42	/ .55
A-10	*lb.*	.35	/ .40
A-11	*lb.*	.52	/ .65
A-19	*lb.*	.52	/ .65
A-32	*lb.*	.70	/ .80
A-77	*lb.*	.42	/ .55
A-100	*lb.*	.42	/ .55
A-100-F-50	*lb.*	.25	/ .35
A-433	*lb.*	.45	/ .55
Accelerator 49	*lb.*	.42	
808	*lb.*		
833	*lb.*		
Acrin	*lb.*		
Aldehyde ammonia	*lb.*		
Altax	*lb.*	.60	/ .70
B-J-F	*lb.*	.50	/ .55
Beutene	*lb.*	.70	/ .75
Butyl Zimate	*lb.*	3.00	
C-P-B	*lb.*	2.00	
Captax	*lb.*	.50	/ .60
Crylene	*lb.*	.40	/ .47
Paste	*lb.*	.30	/ .36
D-B-A	*lb.*	2.00	
Di-Esterex	*lb.*	.60	/ .70
Di-Esterex-N	*lb.*	.60	/ .70
DOTG	*lb.*	.47	
D.O.T.T.U.	*lb.*		
DPG	*lb.*	.35	/ .45
El-Sixty	*lb.*	.50	/ .65
Ethylideneaniline	*lb.*		
Ethyl Zimate	*lb.*	3.00	
Formaldehyde P.A.C.	*lb.*		
Formaldehydeaniline	*lb.*		
Formaldehyde-para-toluidine	*lb.*		
Guantal	*lb.*	.40	/ .50
Hepteen	*lb.*	.35	/ .40
Base	*lb.*	1.35	/ 1.50
Hexamethylenetetramine	*lb.*		
Lead oleate, No. 999	*lb.*	.13	
Witco	*lb.*	.15	
Methylenedianilide	*lb.*		
Monex	*lb.*	3.00	
Novex	*lb.*		
O. N. V.	*lb.*	1.00	/ 1.10
O-X-A-F	*lb.*	$0.50	/$0.55
Ovac	*lb.*	.50	/ .55
Pentex	*lb.*	1.00	/ 1.10
Pip-Pip	*lb.*	2.50	
Pipsolene	*lb.*	1.55	/ 1.85
R-2	*lb.*	1.40	/ 1.80
Base	*lb.*	3.65	
R-23	*lb.*	.40	
R & H 50-D	*lb.*		
Rotax	*lb.*	.60	/ .65
Safex	*lb.*	1.20	/ 1.30
Santocure	*lb.*	1.05	/ 1.30
Super-sulphur No. 1	*lb.*	.50	
No. 2	*lb.*	.20	/ .25
Tetrone A	*lb.*		
Thiocarbanilide	*lb.*	.24	/ .30
Thionex	*lb.*		
Trimene	*lb.*	.55	/ .65
Base	*lb.*	1.05	/ 1.20
Triphenyl guanidine (TPG)	*lb.*		
Tuads	*lb.*	3.00	
Ureka	*lb.*	.60	/ .75
Blend B.	*lb.*	.60	/ .75
C	*lb.*	.56	/ .65
Vulcanex	*lb.*		
Vulcanol	*lb.*		
Vulcone	*lb.*		
Z-B-X	*lb.*	2.50	
Z-88	*lb.*	.44	/ .60
Z-88-P	*lb.*	.51	
Zenite	*lb.*		
A	*lb.*		
B	*lb.*		
Zimate	*lb.*	3.00	
Activator			
Barak	*lb.*		
Age Resisters			
AgeRite Alba	*lb*	1.50	/ 2.10
Exel	*lb.*	1.00	/ 1.40
Gel	*lb.*	.57	/ .77
Hipar	*lb.*	.65	/ .92
HP	*lb.*		
Powder	*lb.*	.52	/ .73
Resin	*lb.*	.52	/ .73
D	*lb.*	.52	/ .73
Syrup	*lb.*		
White	*lb.*	1.25	/ 1.75
Akroflex C	*lb.*		
Albasan	*lb.*	.70	/ .75
Aminox	*lb.*		
Antox	*lb.*		
B-L-E	*lb.*	.52	/ .61
Powder	*lb.*	.65	/ .74
B-X-A	*lb.*	.55	/ .61
Copper Inhibitor X-872	*lb.*		
Flectol B	*lb.*	$0.52	/$0.65
H	*lb.*	.52	/ .65
White	*lb.*	.90	/ 1.15
M-U-F	*lb.*	1.50	
Neozone (standard)	*lb.*		
A	*lb.*		
C	*lb.*		
D	*lb.*		
E	*lb.*		
Oxynone	*lb.*	.64	/ .80
Parazone	*lb.*		
Perflectol	*lb.*	.65	/ .75
Permalux	*lb.*		
Santoflex A	*lb.*	.65	/ .75
B	*lb.*	.52	/ .65
Solux	*lb.*		
Thermoflex	*lb.*		
A	*lb.*		
V-G-B	*lb.*	.52	/ .61
Alkalies			
Caustic soda, flake, Columbia (400 lb. drums)	100 *lbs.*	2.70	/ 3.55
liquid, 50%	100 *lbs.*	1.95	
solid (700 lb. drums)	100 *lbs.*	2.30	/ 3.15
Antiscorch Materials			
A-F-B	*lb.*	.35	/ .40
Antiscorch T	*lb.*		
Cumar RH	*lb.*	.09	
R-17 Resin (drums)	*lb.*	.10	
RM	*lb.*		
Retarder B	*lb.*		
W	*lb.*		
T-J-B	*lb.*		
U.T.B.	*lb.*	.35	/ .40
Antisun Materials			
Heliozone	*lb.*		
Sunproof	*lb.*	.27	/ .30
Brake Lining Saturant			
B. R. T. No. 3	*lb.*	.0165/	.0175
Colors			
BLACK			
Lampblack (commercial)	*lb.*	.15	
BLUE			
Brilliant	*lb.*		
Prussian	*lb.*	.0375	
Toners	*lb.*	.08	/ 3.85
BROWN			
Mapico	*lb.*	.11	
GREEN			
Brilliant	*lb.*		
Chrome, light	*lb.*		
medium	*lb.*		
oxide (freight allowed)	*lb.*	.22	

Dark	lb.	
Guignet's, Easton, Pa., bbls.	lb.	$0.70
Light	lb.	
Toners	lb.	.85 /$3.75
ORANGE		
Lake	lb.	
Toners	lb.	.40 / 1.60
ORCHID		
Toners	lb.	1.50 / 2.00
PINK		
Toners	lb.	1.50 / 4.15
PURPLE		
Permanent	lb.	
Toners	lb.	.60 / 2.10
RED		
Antimony		
Crimson, 15/17%	lb.	.45
R. M. P. No. 3	lb.	.48
Sulphur free	lb.	.50
R.M.P.	lb.	.52
Golden 15/17%	lb.	.28
7-A	lb.	.37
Z-2	lb.	.23
Aristi	lb.	1.75
Cadmium, light (400 lb. bbls.)	lb.	.70 / .75
Chinese	lb.	
Crimson	lb.	
Mapico	lb.	.0925
Medium	lb.	
Rub-Er-Red, Easton, Pa., bbls.	lb.	.0925
Scarlet	lb.	
Toners	lb.	.08 / 2.00
WHITE		
Lithopone (bags)	lb.	.04⅜/ .04⅝
Albalith Black Label-11	lb.	.04⅜/ .04⅝
Astrolith	lb.	.04⅜/ .04⅝
Azolith	lb.	.04⅜/ .04⅝
Cryptone-19	lb.	.05¾/ .06¼
CB-21	lb.	.05¾/ .06¼
ZS No. 20	lb.	.09 / .0925
No. 86	lb.	.09 / .0925
No. 230	lb.	.09 / .0925
Sunolith	lb.	.04⅜/ .04⅝
Ray-Bar	lb.	.05¾/ .06¼
Ray-Cal	lb.	.05¾/ .06¼
Rayox	lb.	.16 / .19
Titanolith (5-ton lots)	lb.	.05¾/ .06¼
Titanox-A (50-lb. bags)	lb.	.16 / .1675
B (50-lb. bags)	lb.	.05¾/ .06¼
B-30 (50-lb. bags)	lb.	.05¾/ .06¼
C (50-lb. bags)	lb.	.05¾/ .06¼
Ti-Tone	lb.	
Zinc Oxide		
Anaconda, Green Seal No. 333	lb.	.08 / .085
Lead Free No. 109	lb.	.0625/ .0675
No. 116	lb.	.0625/ .0675
No. 352	lb.	.075 / .08
No. 570	lb.	.075 / .08
No. 577	lb.	.075 / .08
Red Seal No. 222	lb.	.075 / .08
U.S.P. No. 777 (bbls.)	lb.	.095 / .0975
White Seal No. 555	lb.	.085 / .09
Azo ZZZ-11	lb.	.0625/ .065
44	lb.	.0625/ .065
55	lb.	.0625/ .065
66	lb.	.0625/ .065
French Process, Florence		
White Seal-7 (bbls.)	lb.	.085 / .0875
Green Seal-8	lb.	.08 / .0825
Red Seal-9	lb.	.075 / .0775
Kadox, Black Label-15	lb.	.065 / .0675
No. 25	lb.	.075 / .0775
Red Label-17	lb.	.065 / .0675
Horse Head Special 3	lb.	.0625/ .065
XX Red-4	lb.	.0625/ .065
23	lb.	.0625/ .065
72	lb.	.0625/ .065
78	lb.	.0625/ .065
80	lb.	.0625/ .065
103	lb.	.0625/ .065
110	lb.	.0625/ .065
St. Joe (lead free)		
Black Label	lb.	.0625/ .065
Green Label	lb.	.0625/ .065
Red Label	lb.	.0625/ .065
U.S.P.	lb.	.095 / .0975
White Jack	lb.	.09 / .0925
Zopaque (bags)	lb.	.16 / .1675
YELLOW		
Cadmolith (cadmium yellow), 400 lb. bbls.	lb.	.45 / .50
Lemon	lb.	
Mapico	lb.	.0675
Toners	lb.	2.50

Dispersing Agents

Bardol	lb.	.0215/ .024
Darvan	lb.	.30 / .50
Nevoll (drums)	lb.	.0215
Santomerse	lb.	.11 / .25

Fillers, Inert

Asbestine, c.l., f.o.b. mills	ton	15.00
Barytes	ton	30.00 /36.00
f.o.b., St. Louis (50 lb. paper bags)	ton	22.85
off color, domestic	ton	20.00 /25.00
white, imported	ton	29.00 /32.00
Blanc fixe, dry, precip.	lb.	.035 / .05
Calcene	ton	37.50 /43.00
Infusorial earth	lb.	.02 / .03
Kalite No. 1	ton	24.00 /50.00
No. 3	ton	34.00 /60.00
Magnesia, calcined, heavy	lb.	$0.04
Carbonate, l.c.l.	lb.	.07 /$0.095
Pyrax A	ton	7.50 /20.00
Whiting		
Columbia Filler	ton	9.00 /14.00
Domestic	100 lbs.	
Guilders	100 lbs.	
Hakuenka	lb.	
Paris white, English cliffstone	100 lbs.	
Southwark Brand, Commercial	100 lbs.	
All other grades	100 lbs.	
Suprex, white extra light	ton	45.00 /60.00
heavy	ton	45.40 /60.00
Witco, c.l.	ton	7.00

Finishes

IVCO lacquer, clear	gal.	1.55 / 2.55
colors	gal.	2.60 / 3.25
Rubber lacquer, clear	gal.	
colored	gal.	
Starch, corn, pwd.	100 lbs.	
potato	lb.	
Talc	ton	25.00 /45.00

Flock

Cotton flock, dark	lb.	.105 / .115
dyed	lb.	.45 / .75
white	lb.	.115 / .175
Rayon flock, colored	lb.	1.15 / 1.50
white	lb.	1.00

Latex Compounding Ingredients

Accelerator 85	lb.	
89	lb.	
122	lb.	
552	lb.	
Aerosol	lb.	.45
Antox, Dispersed	lb.	
Aquarex A	lb.	
D	lb.	
F	lb.	
Areskap No. 50	lb.	.18 / .24
No. 100, dry	lb.	.39 / .51
Aresket No. 240	lb.	.16 / .22
No. 250, alcoholic	lb.	.22
No. 300, dry	lb.	.42 / .50
Aresklene No. 375	lb.	.35 / .50
No. 400, dry	lb.	.51 / .65
Black No. 25, Dispersed	lb.	.22 / .40
Catalpo	ton	
Color Pastes, dispersed	lb.	
Dispersex No. 15	lb.	.11 / .12
No. 20	lb.	.08 / .10
Emo, brown	lb.	.15
white	lb.	.15
Factice Compound, Dispersed	lb.	.35
Heliozone, Dispersed	lb.	
Igepon A	lb.	
MICRONEX, Colloidal	lb.	.055 / .07
Nekal BX (dry)	lb.	
Palmol	lb.	.12
Pipsol X	lb.	3.05 / 3.55
R-23	lb.	.57
RN-2	lb.	1.40 / 1.80
S.1 (400 lb. drums)	lb.	.65
Santomerse	lb.	.11 / .25
Dry	lb.	.41 / .65
Santovar A	lb.	1.15 / 1.40
Stablex A	lb.	.90 / 1.10
B	lb.	.65 / .90
C	lb.	.40 / .50
Sulphur, Dispersed	lb.	.10 / .15
No. 2	lb.	.075 / .15
T.1. (400 lb. drums)	lb.	.40
Tepidone	lb.	
Vulcan Colors	lb.	
Zinc oxide, Colloidal	lb.	
Dispersed	lb.	.12 / .15

Mineral Rubber

B. R. C. No. 20	lb.	.009 / .01
Black Diamond	ton	25.00
Genasco Hydrocarbon, granulated, (fact'y)	ton	
solid	ton	
Gilsonite Hydrocarbon (factory)	ton	
Hydrocarbon, hard	ton	22.00 /42.00
soft	ton	
Parmr Grade 1	ton	25.00 /27.00
Grade 2	ton	25.00 /27.00
Pioneer	ton	
285°-300°	lb.	22.00 /42.00

Mold Lubricants

Lubrex	lb.	.25 / .30
Mold Paste	lb.	.12 / .18
Sericite	ton	65.00 /75.00
Soapbark	lb.	
Soapstone	ton	25.00 /35.00

Oil Resistant

AXF	lb.	

Reclaiming Oils

B. R. V.	lb.	.03 / .0325
S. R. O.	lb.	.0175/ .0185

Reenforcers

Carbon Black		
Aerfloted Arrow Specification Black	lb.	
Arrow Compact Granulized Carbon Black	lb.	
"Certified" Heavy Compressed, Cabot	lb.	
Spheron	lb.	
Continental Dustless, c.l.	lb.	$0.0275/$0.0375
Compressed c.l.	lb.	.0275/ .0375
Uncompressed, c.l.	lb.	.0275/ .0375
Disperso, c.l.	lb.	.0275/ .0375
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275
c.l., delivered New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
Dixiedensed, c.l., f.o.b., New Orleans, La., Galveston or Houston, Tex.	lb.	.0275
c.l., delivered New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
Dixiedensed 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275
c.l., delivered New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
Excello, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0505/ .0705
l.c.l., delivered New York	lb.	.07 / .09
Fumonex, c.l., f.o.b. works	lb.	.03
ex-warehouse	lb.	.045
Gastex	lb.	.03 / .07
Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275
c.l., delivered New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
Kosmobile 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275
c.l., delivered New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275
c.l., delivered New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
MICRONEX Beads, c.l., f.o.b. Gulf ports	lb.	.0275
c.l., delivered, New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
Mark II, c.l., f.o.b. Gulf ports	lb.	.0275
c.l., delivered, New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
Standard, c.l., f.o.b. Gulf ports	lb.	.0275
c.l., delivered, New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
W-5, c.l., f.o.b., Gulf ports	lb.	.0275
c.l., delivered, New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
W-6, c.l., f.o.b., Gulf ports	lb.	.0275
c.l., delivered, New York	lb.	.0375
local stock, bags, delivered	lb.	.0625
Paradene No. 2 (drums)	lb.	.04
Pelletex	lb.	.03 / .07
Supreme, c.l., f.o.b. Gulf Ports	lb.	.0445/ .0645
delivered New York	lb.	.0505/ .0705
l.c.l. delivered New York	lb.	.07 / .09
"WYEX BLACK"	lb.	
Carbonex (bags)	lb.	.029 / .0315
"S" (bags)	lb.	.0315/ .034
Clays		
Aerfloted Paragon (50 lb. bags)	ton	9.50
Suprex (50 lb. bags)	ton	9.50
China	ton	17.50 /20.00
Dixie	ton	11.00 /30.00
Tunior	ton	9.50 /29.00
McNamee	ton	9.50 /22.00
Par	ton	9.50 /22.00
Witco, f.o.b. Works	ton	9.50
Cumar EX	lb.	.035
P-33	lb.	.0475/ .0775
Thermax	lb.	.025 / .055
Velvetex	lb.	.03 / .045

Reordorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Curodex 19	lb.	2.75
188	lb.	3.50
198	lb.	4.50
Rodo No. 0	lb.	3.50 / 4.00
No. 10	lb.	4.50 / 5.00

(*Continued on page* 86)

COTTON AND FABRICS

New York Quotations

April 22, 1938

Drills	
38-inch 2.00-yard ....yd.	$0.11
40-inch 3.47-yard	.06⅞
50-inch 1.52-yard	.15
52-inch 1.85-yard	.12½
52-inch 1.90-yard	.11¾
52-inch 2.20-yard	.10½
52-inch 2.50-yard	.09¼
59-inch 1.85-yard	.12
Ducks	
38-inch 2.00-yard D. F. ......yd.	.11
40-inch 1.45-yard S. F.	.16¼
51½-inch 1.35-yard D. F.	.16¼
72-inch 1.05-yard D. F.	.22 /.23
72-inch 17.21-ounce	.25¼
Mechanicals	
Hose and belting ....lb.	.24
Tennis	
52-inch 1.35-yard ....yd.	.17
Hollands	
Gold Seal and Eagle	
20-inch No. 72 ....yd.	.09½
30-inch No. 72	.17
40-inch No. 72	.19
Red Seal and Cardinal	
20-inch ....yd.	.08
30-inch	.14¾
40-inch	.16
50-inch	.24
Osnaburgs	
40-inch 2.34-yard ....yd.	.09⁵/₈
40-inch 2.48-yard	.09
40-inch 2.56-yard	.08½
40-inch 3.00-yard	.07⅛
40-inch 7-ounce part waste......	.06⅞
40-inch 10-ounce part waste	.10
37-inch 2.42-yard	.09⅛
Raincoat Fabrics	
Cotton	
Bombazine 60 x 64........yd.	.07½
Plaids 60 x 48..........	.10½
Surface prints 60 x 64........	.11½
Print cloth, 38½-inch, 60 x 64.	.04¼
Sheetings, 40-inch	
48 x 48, 2.50-yard........yd.	.07¼
64 x 68, 3.15-yard..........	.07
56 x 60, 3.60-yard..........	.06
44 x 40, 4.25-yard..........	.04⅞
Sheetings, 36-Inch	
48 x 48, 5.00-yard........yd.	.04¼
44 x 40, 6.15-yard	.03½
Tire Fabrics	
Builder	
17¼ ounce 60" 23/11 ply Karded peeler ....lb.	.30
Chafer	
14 ounce 60" 20/8 ply Karded peeler ....lb.	.30
9¼ ounce 60" 10/2 ply Karded peeler ....lb.	.29
Cord Fabrics	
23/5/3 Karded peeler, 1$\frac{1}{16}$" cotton ....lb.	.31
15/3/3 Karded peeler, 1$\frac{1}{16}$" cotton ....lb.	.29
23/5/3 Karded peeler, 1¼" cotton ....lb.	.36½
23/5/3 Combed Egyptian...lb.	.50
Leno Breaker	
8¼ ounce and 10¼ ounce 60" Karded peeler ....lb.	.32

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Feb. 26	Mar. 26	Apr. 2	Apr. 9	Apr. 16	Apr. 23
Mar.	9.11	....	....	....	....	....
Apr.	9.13	8.68	8.62	8.54	....	....
May	....	....	8.66	8.58	8.92	8.88
July	9.24	8.79	8.74	8.64	8.96	8.96
Sept.	9.29	8.82	8.78	8.71	9.02	9.02
Dec.	9.29	8.87	8.82	8.75	9.09	9.07
Feb.	....	8.88	8.86	8.80	9.14	9.13
Mar.	....	....	8.88	8.84	9.17	9.16

THE accompanying table of week-end closing prices on the New York Cotton Exchange shows the week-end change of representative futures covering the past two months.

After closing on March 31 at 8.69¢ per pound, up 8 points, the New York spot middling price declined to 8.44¢ on April 7 and recovered to 8.57¢ the following day. Influenced somewhat by the inflationary implications of the government's proposed spending program, the price rose steadily to 9.03¢ on April 18. The closing price on April 30 was 8.78¢.

Sales at 13 southern markets during 15 days since March 31 totaled 70,380 bales, as compared with 78,583 bales for the same days one year ago.

Consumption of all cottons in domestic mills during March totaled 510,-941 bales, against 427,588 bales in February and 776,942 bales in March, 1936, according to a report from the Census Bureau.

The Department of Commerce reported 1937 exports of raw cotton (excluding linters) aggregated 5,728,009 bales, value $360,023,000, against 5,408,-549 bales, value $358,822,000, in 1936. From the standpoint of value, raw cotton represented 10.93% of United States exports of domestic merchandise in the calendar year 1937, compared with 14.63% in 1936.

Fabrics

Although some improvement in demand has taken place, the fabrics market in general remained sluggish during the past month. Because of recent indications of buying interest, a gradual improvement in market conditions is anticipated.

Prices of tire fabrics, ducks, hollands, and osnaburgs remain at last month's levels; while some slight reductions were registered in drills and raincoat fabrics.

New York Quotations

(Continued from page 84)

Rubber Substitutes		
Black ....lb.	$0.07	/$0.135
Brown ....lb.	.085 /	.14
White ....lb.	.085 /	.1525
Factice		
Amberex ....lb.	.20	
Brown ....lb.	.085 /	.145
Neophax A ....lb.	.1075	
B ....lb.	.1075	
Fac-Cel B ....lb.	.1625	
C ....lb.	.1625	
White ....lb.	.085 /	.1525
Softeners		
Bondogen ....lb.	.98	/ 1.65
Burgundy pitch ....lb.	.06	
Cycline oil ....gal.	.14 /	.20
Nuba resinous pitch (drums)		
Grades No. 1 and No. 2.lb.	.03	
Grade No. 3 ....lb.	.04	
Palm oil (Witco), c.l. ......lb.	.0575	
Pine tar ....gal.		
Plastogen ....lb.	.0775/	.125
Plastone ....lb.	.30 /	.35
R-19 Resin (drums) ......lb.	.10	
R-21 Resin (drums) ......lb.	.10	
Reogen ....lb.	.115 /	.30
Rosin oil, compounded....gal.	.40	
RPA No. 1..........lb.		
No. 2 ....lb.		
Rubtack ....lb.	.10	
Tackol ....lb.	.085 /	.18
Tonox D ....lb.	.75 /	.85
Witco No. 20 ....gal.	.20	
X-1 Resinous oil (tank car).lb.	.01	
Softeners for Hard Rubber Compounding		
Resin C Pitch 55° C. M.P....lb.	.013 /	.014
Resin C Pitch 70° C. M.P....lb.	.013 /	.014
Resin C Pitch 85° C. M.P....lb.	.013 /	.014
Solvents		
Beta-Trichlorethane ......gal.		
Carbon bisulphide ....lb.		
tetrachloride ....lb.		
Industrial 90% benzol (tank car) ....gal.	.16	
Stabilizers for Cure		
Laurex, ton lots ....lb.	.13 /	.15
Stearex B ....lb.	.105 /	.115
Beads ....lb.	.095 /	.105
Stearic acid, single pressed.lb.	.105 /	.115
Stearite ....100 lbs.	9.50	/10.50
Zinc stearate ....lb.	.23	
Synthetic Rubber		
Neoprene Type E..........lb.		
G ....lb.		
H ....lb.		
M ....lb.		
Latex Type 50..........lb.		
55 ....lb.		
56 ....lb.		
"Thiokol" A (f.o.b. Yardville) ....lb.	.35	
Coating materials ......gal.	2.50	/ 5.00
DX ....lb.	.55	
Molding Powder ....lb.	.50 /	.75
Tackifier		
B. R. H. No. 2..........lb.	.015 /	.016
Varnish		
Shoe ....gal.	1.45	
Vulcanizing Ingredients		
Sulphur		
Chloride, drums ....lb.	.035 /	.04
Rubber ....100 lbs.	2.65	
Telloy ....lb.	2.00	
Vandex ....lb.	2.00	
(See also Colors—Antimony)		
Waxes		
Carnauba, No. 3 chalky....lb.	.37⅛	
2 N.C. ....lb.	.39⅞	
3 N.C. ....lb.	.37⅛	
1 Yellow ....lb.	.4575	
2 ....lb.	.4425	
Montan, crude ....lb.	.11	

U. S. Crude and Waste Rubber Imports for 1938

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Totals 1938	Totals 1937	Balata	Miscellaneous	Waste
Jan. ....tons	39,744	1,259	411	177	6	538	42,135	32,820	41	526	8
Feb.	41,709	1,400	453	150	..	218	43,930	43,289	35	808	22
Mar.	34,252	861	371	278	..	205	35,967	52,039	37	555	93
Total 3 mos., 1938 ......tons	115,705	3,520	1,235	605	6	961	122,032	.....	113	1,889	123
Total 3 mos., 1937 ......tons	119,367	5,388	2,627	229	36	501	.....	128,148	71	2,577	990

Compiled from The Rubber Manufacturers Association, Inc., statistics.

United States Latex Imports

Year	Lbs. Solids	Value
1936	44,469,504	$6,659,899
1937	51,934,040	10,213,670
1938		
Jan.	3,135,524	494,242
Feb.	3,772,897	560,883
Mar.	2,192,459	327,844

Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	January, 1938		January, 1937	
	Quantity	Value	Quantity	Value
UNMANUFACTURED—*Free*				
Crude rubber .... *lb.*	98,523,748	$15,115,732	94,083,922	$15,408,242
Liquid latex (solids) ..... *lb.*	3,135,524	494,242	2,995,027	535,546
Jelutong or pontianak .... *lb.*	1,338,625	224,443	552,567	56,056
Balata .... *lb.*	51,509	8,958	22,616	4,348
Gutta percha .... *lb.*	106,115	16,283	283,140	52,017
Guayule .... *lb.*	1,204,600	147,685	358,500	44,166
Siak .... *lb.*	11,200	1,178	......	......
Scrap and reclaimed ...... *lb.*	308,473	4,022	1,874,387	20,280
Totals	104,679,794	$16,012,543	100,170,159	$16,120,655
Chicle, crude .... *lb.*	1,280,712	$404,446	1,460,410	$422,485
MANUFACTURED—*Dutiable*				
Rubber tires .... *no.*	1,639	$1,987	5,351	$13,983
Rubber boots, shoes, and overshoes .... *prs.*	6,583	720	3,832	2,221
Rubber soled footwear with fabric uppers .... *prs.*	74,195	20,827	74,847	14,124
Golf balls .... *no.*	15,336	1,362	4,560	1,150
Lawn tennis balls .... *no.*	66,984	4,936	61,394	4,811
Other rubber balls .... *no.*	462,766	24,796	681,468	24,458
Other rubber toys .... *lb.*	87,553	13,980	46,675	6,715
Hard rubber combs .... *no.*	40,428	2,780	75,600	4,437
Other manufactures of hard rubber	......	3,185	......	5,041
Friction or insulating tape. *lb.*	10,250	617	9,300	545
Belts, hose, packing, and insulating material	......	4,657	......	4,418
Druggists' sundries of soft rubber	......	8,372	......	5,359
Inflatable swimming belts, floats, etc .... *no.*	65,487	4,796	147,751	9,175
Other rubber and gutta percha manufactures .... *lb.*	135,409	26,286	111,765	21,290
Totals	......	$119,301	......	$117,727

Exports of Foreign Merchandise

	January, 1938		January, 1937	
RUBBER AND MANUFACTURES	Quantity	Value	Quantity	Value
Crude rubber .... *lb.*	728,230	$118,514	1,890,008	$372,053
Balata .... *lb.*	38,058	11,939	57,159	15,374
Other rubber, rubber substitutes and scrap .... *lb.*	78,431	10,225	4,210	1,282
Rubber manufactures (including toys)	......	1,289	......	2,235
Totals	......	$141,967	......	$390,944

Exports of Domestic Merchandise

	January, 1938		January, 1937	
RUBBER AND MANUFACTURES	Quantity	Value	Quantity	Value
Reclaimed .... *lb.*	1,473,745	$83,136	1,918,592	$87,750
Scrap .... *lb.*	4,427,588	76,311	1,554,801	48,346
Cements .... *gal.*	30,621	25,626	21,335	18,084
Rubberized automobile cloth, *sq. yd.*	28,087	12,936	48,266	21,932
Other rubberized piece goods and hospital sheeting .. *sq. yd.*	149,938	66,258	126,406	50,857
Boots .... *prs.*	19,528	38,438	12,029	27,110
Shoes .... *prs.*	7,027	5,636	13,325	8,616
Canvas shoes with rubber soles .... *prs.*	19,737	19,238	15,534	9,269
Soles .... *doz. prs.*	......	......	4,489	7,722
Heels .... *doz. prs.*	10,171	6,743	63,058	35,190
Soling and top lift sheets .. *lb.*	28,207	6,621	34,363	5,836
Gloves and mittens .. *doz. prs.*	5,488	12,908	6,353	12,822
Water bottles and fountain syringes .... *no.*	15,143	5,004	15,039	4,785
Other druggists' sundries	......	41,617	......	37,242
Gum rubber clothing ..... *doz.*	29,240	38,210	24,547	39,279
Balloons .... *gross*	21,445	16,102	28,962	20,209
Toys and balls	......	4,989	......	6,050
Bathing caps .... *doz.*	1,648	3,220	2,912	4,735
Bands .... *lb.*	19,449	8,208	19,952	7,735
Erasers .... *lb.*	23,773	13,835	30,780	17,939
Hard rubber goods				
Electrical battery boxes. *no.*	23,477	15,937	26,875	5,581
Other electrical .... *lb.*	48,530	10,672	36,165	10,649
Combs, finished .... *doz.*	35,405	10,621	5,587	3,453
Other hard rubber goods ..	......	15,897	......	17,797
Tires				
Truck and bus casings .. *no.*	20,203	395,859	18,112	350,378
Other auto casings ..... *no.*	56,704	510,935	61,517	609,902
Tubes, auto .... *no.*	58,403	85,098	53,567	85,018
Other casings and tubes. *no.*	4,578	26,991	4,354	36,806
Solid tires for automobiles and motor trucks .... *no.*	416	9,927	340	8,948
Other solid tires .... *lb.*	51,750	8,770	115,654	16,390
Tire sundries and repair materials	......	53,942	......	78,222
Rubber and friction tape .. *lb.*	78,046	19,930	74,240	19,749
Fan belts for automobiles. *lb.*	38,421	20,125	42,212	25,481
Other rubber and balata belts .... *lb.*	206,735	118,354	177,554	91,832
Garden hose .... *lb.*	50,699	94,440	59,892	15,153
Other hose and tubing .... *lb.*	297,969	111,399	416,118	138,410
Packing .... *lb.*	92,348	46,653	138,854	59,667
Mats, matting, flooring, and tiling .... *lb.*	68,265	9,595	82,055	14,731
Thread .... *lb.*	18,120	12,617	98,304	43,633
Gutta percha manufactures. *lb.*	25,815	10,631	135,157	32,614
Other rubber manufactures ..	......	93,754	......	127,535
Totals	......	$2,082,183	......	$2,263,457

Imports by Customs Districts

	February, 1938 *Crude Rubber		February, 1937 *Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	5,548,124	$832,551	13,385,743	$2,371,277
St. Lawrence	......	......	1,090	207
New York	74,339,789	10,906,139	53,733,112	9,404,963
Philadelphia	533,000	72,558	2,232,823	378,102
Maryland	725,123	103,004	3,894,034	664,619
Mobile	......	......	685,390	110,921
New Orleans	4,094,650	706,011	2,173,975	354,474
Los Angeles	6,424,246	959,645	22,672,026	3,702,398
San Francisco	358,440	57,032	941,283	153,897
Oregon	......	......	4,480	672
Washington	......	......	239,510	41,605
Chicago	......	......	123,252	20,190
Colorado	448,000	79,469	536,170	99,551
Totals	92,471,372	$13,716,409	100,622,888	$17,302,876

*Crude rubber including latex dry rubber content.

Rubber Goods Production Statistics

	1938 Jan.	1937 Jan.
TIRES AND TUBES		
Pneumatic casings:		
Production .... *thousands*	2,743	4,980
Shipments, total ...... *thousands*	2,490	4,509
Domestic .... *thousands*	*	4,421
Stocks, end of month .. *thousands*	10,988	11,377
Inner Tubes:		
Production .... *thousands*	2,388	4,801
Shipments, total ...... *thousands*	2,342	4,391
Domestic .... *thousands*	*	4,327
Stocks, end of month .. *thousands*	10,198	11,100
Raw material consumed:		
Fabrics .... *thous. of lbs.*	.....	22,207
MISCELLANEOUS PRODUCTS		
Single and double texture proofed fabrics:		
Production .... *thous. of yds.*	1,978	3,884
Rubber and canvas footwear:		
Production, total ... *thous. of prs.*	3,588	5,898
Tennis .... *thous. of prs.*	1,915	2,418
Waterproof .... *thous. of prs.*	1,673	3,480
Shipments, total ..... *thous. of prs.*	3,937	6,018
Tennis .... *thous. of prs.*	2,363	2,639
Waterproof .... *thous. of prs.*	1,574	3,379
Shipments, domestic, total .. *thous. of prs.*	3,894	5,954
Tennis .... *thous. of prs.*	2,338	2,603
Waterproof .... *thous. of prs.*	1,555	3,351
Stocks, total, end of month .. *thous. of prs.*	20,031	13,454
Tennis .... *thous. of prs.*	6,965	5,108
Waterproof .... *thous. of prs.*	13,065	8,346

* Data not available.

The above figures have been adjusted to represent 100% of the industry based on reports received which represented 81% for 1936-37.

Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	COMMODITY	CITY AND COUNTRY
†5,639	Baby carriages with rubber tires, toys, and sponges	Tirana, Albania
†5,699	Balls	Antwerp, Belgium
*5,700	Surgeons' gloves	Athens, Greece
†5,750	Shoe heels, and water and steam hose	Harbin, Manchuria
*5,771	Tires and tubes	Hong Kong, China
†5,786	Hospital and surgical goods	Jerusalem, Palestine
†5,803	Toys	Saigon, Indo-China
*5,821	Novelties and toys	London, England
*5,831	Automobile accessories and parts	Johannesburg, South Africa
†5,833	Automobile accessories and parts	Zvolen, Czechoslovakia
*5,842	Fan belting	Buenos Aires, Argentina
†5,855	Rubber-covered wire	Rio de Janeiro, Brazil
¶5,872	Stationery supplies	Toronto, Canada
*5,879	Novelties	Rio Piedras, Puerto Rico
*5,881	Elastic step-in girdles	Prague, Czechoslovakia
*5,887	Elastic threads and covered rubber thread	St. Etienne, France
*5,892	Elastic webbing	Habana, Cuba
‡5,901	Rubber-stamp-making machines	Nairobi, Africa
†5,903	Automobile and truck casings and tires	Foochow, China
†5,904	Bathing shoes	Veracruz, Mexico
†5,905	Automobile and truck accessories and parts	Rouen, France
¶5,929	Galoshes, workmen's boots, tennis shoes, and snow boots	Hamburg, Germany
†5,947	Novelties	London, England
*5,998	Rubber gloves, tubing, and druggists' sundries	Calcutta, India
*6,000	Rubberized fabric and hot water bottles	London, England
*6,003	Automobile accessories and parts	Lisbon, Portugal
*6,018	Tires	Tel Aviv, Palestine
*6,050	Hospital and hygienic rubber goods	Cairo, Egypt

*Agency. †Purchase. ‡Purchase and agency. ¶Purchase or agency.